PAPERS

RELATING TO

# TECHNICAL EDUCATION IN INDIA

1886—1904.



CALCUTTA:
OFFICE OF THE SUPERINTENDENT OF GOVERNMENT PRINTING, INDIA,
1906.

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** A memorandum on Technical Education in India, was written in 1886
* by Sir A. P. Macdonnell, when officiating as Secretary to the Government of India. The circulation of this memorandum, and a subsequent resolution from the Government of India suggesting the institution of industrial surveys, gave rise to correspondence and reports which, together with Sir A. P. Macdonnell's memorandum, are here reproduced. The later papers which are included in this volume comprise the letter addressed to Local Governments upon the encouragement of technical and industrial education in November 1901 after the Simla Conference; the despatches in which the Secretary of State sanctioned a scheme for State technical scholarships; and the resolutions in which the Government of India reviewed the reports of Sir E. Buck and Colonel Clibborn's committee upon technical and industrial education.

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CENTRAL PROVINCES.

# PAPERS

RELATING TO

# TECHNICAL EDUCATION IN INDIA

# 1886—1904.

## *Memorandum on Technical Education in India prior to 1886.*

Letter No. $\frac{7}{211-18 A.}$, dated the 23rd July 1886.

From—A. P. MACDONNELL, Esq., C.S., Officiating Secretary to the Government of India, Home Department,
To—All Local Governments and Administrations (except Madras).

No. 1. Technical Education in INDIA to 1886.

In continuation of Home Department Circular letter No. $\frac{16}{284-292}$, dated the 16th September 1885, I am directed to forward the accompanying copy of a memorandum which has been drawn up in this Department on the subject of Technical Education in India.

2. The Governor General in Council would be glad to know whether the suggestions made in this Memorandum ......... meet with the concurrence of ________________; and, if so, what steps, having due regard to financial considerations, ________________ would propose to take in order to give effect thereto.

### MEMORANDUM.

His EXCELLENCY the Viceroy has expressed a desire that a memorandum on the condition and prospects of Technical Education in India should be prepared and submitted to him. The following Note is an endeavour to fulfil His Excellency's commands.

Introductory: Division of progress in education into three periods.

1. The Education Commission, in reviewing the history of education in British India, divide the subject into three periods. They observe that each period is marked by a distinctive character of its own, which is common, more or less, to all the provinces of the Empire.

2. The first period embraces the years of educational activity prior to the Court of Directors' well-known despatch of 1854, when a new departure was taken. During this period the responsibility of the State for the education of the people was unacknowledged, and much of the good work then done was due to the endeavours of missionary and other philanthropic bodies, sometimes with, sometimes without, official assistance. The distinctive character of this period was, as far as State efforts were concerned, the attention which was paid to collegiate education.

3. The second period in the educational history of British India was ushered in by the great despatch of 1854, and lasted till 1871. Public instruction now became a recognized State obligation; but administratively the distinctive character of the period was the extension of secondary education, that is, of schools in which English is the medium of instruction, and the final standard aimed at is the University Entrance Examination.

4. The third period covers the interval between 1871 and the present time. It dates from Lord Mayo's decentralization scheme, and is contemporaneous with the control of Local Governments over educational matters in their respective provinces. Its distinctive character is the attention which has been paid to elementary instruction among the masses of the people.

Sub-division of first period.

5. This broad division of the educational history of British India into three periods loses sight, however, of some well-marked and interesting stages; and to give due prominence to these, the first period might well be sub-divided into three. The first sub-division would end about the year 1825, when effect was given to that provision of the Charter Act of 1813 which appropriated a lakh

of rupees annually for educational purposes, and when the first nuclei of committees of public instruction were established in the three presidencies. The distinctive character of this sub-period was the great activity of missionary bodies in the cause of education, and the small recognition afforded by the Government, always immersed in war, of its duty in the same cause.

The second sub-period may be considered as ending about 1840, after the publication of Lord Auckland's famous minute, by which the great controversy * between the "Anglicists" and the "Orientalists," was finally decided in favour of the former. This period was marked, not only by the controversy just referred to, but by the consolidation and extension of educational boards and committees which, in the previous period, had struggled into existence.

* The "Anglicists" advocated education through the medium of English and the Vernaculars, in accordance with modern ideas; the Orientalists advocated education through the medium of the Oriental classics on old established rules. The controversy was decided in favour of English and the modern system, chiefly through the powerful aid of Macaulay, then Legal Member of Council.

The third and last sub-period ended in 1854 with the reception of the Court of Directors' great educational despatch of that year, and was, as the Education Commission say, distinguished by the attention paid to higher or collegiate education. Funds were scarce; and Indian administrators during this period were satisfied with the "downward filtration" theory of education.

6. Thus from the commencement of this century,—and, as far as Public Instruction is concerned, this practically means from the commencement of British rule,—education in India has passed through five cycles, each cycle covering a period of about Sfteen years. First, there was the stage of missionary activity and State quiescence; then a stage of spasmodic and unsystematized official effort; next, systematic administration directed mainly towards the promotion of collegiate education; fourthly, the recognition of public instruction as a State obligation and an effort to fulfil it by the extension of secondary schools; lastly, the systematic development of elementary education among the masses of the population.

Origin of technical education.

7. In the preceding sketch of the progress of education in British India, it will be observed that no reference has been made to technical instruction. It is, indeed, true that in the despatch of 1854 a passage, quoted in the margin, occurs which might almost be construed as an encouragement and direction to establish technical schools. And, having regard to the history of the question, such a construction could be scarcely regarded as strained. The great advantages of technical instruction had in 1854 been brought home to the public mind in England. A Select Committee of the House of Commons had in 1835 enquired into the best means of extending among the manufacturing population a knowledge of the principles of art and design; and a "Government School of Design" established in London, with a system of grants-in-aid to similar schools in the manufacturing districts, had grown out of that enquiry. The progress made, however, was small, until the International Exhibition of 1851 drew public attention to the deficiencies as regards art of the English workman, and as regards science of the English manufacturer. The result was the creation in 1853 of the Department of Science and Art, which three years later came under the control of the Department of Education. It is, therefore, a not altogether improbable inference that the enlightened man † who drafted the despatch of 1854 had, by the passage quoted in the margin above, intended to suggest a far-reaching scheme of technical and industrial instruction for India.

"Our attention should now be directed to a consideration, if possible, still more important, and one which has been hitherto, we are bound to admit, too much neglected, namely, how useful and practical knowledge suited to every station in life may be best conveyed to the great mass of the people who are utterly incapable of obtaining any education worthy of the name by their own unaided efforts; and we desire to see the active measures of Government more especially directed for the future to this object, for the attainment of which we are ready to sanction a considerable increase of expenditure."

† Believed to be the late Mr. J. S. Mill.[1]

Growing necessity for technical instruction in India.

8. But if any such intention was entertained, it was not fulfilled—a result which should surprise no one, seeing that for Government employment the market then was not overstocked, while there were in India at the time but few of these mining, manufacturing, and other industrial enterprises which now afford such strong inducements to Technical training. Since then things have greatly changed. The supply of eligible candidates for Government service has far outrun the demand. The Bar, the Medical, and the Engineering professions absorb only a small portion even of our University graduates. Our schools and colleges are yearly adding to the crowd of young men whom our system of education has rendered discontented with the sphere of life to which they were born without fitting them for another. The difficulty is a growing one, and its seriousness is appreciated by all sections of the public. The following extract from a Native newspaper, *The Mahratta*, of May 9th, is a fair sample of the opinions which, at the present time, find constant expression in the Native Press:—

> We have had, roughly speaking, but a very short experience of the English liberal educational system; for a period of 25 or 30 years counts for little in a nation's life. And yet even in this short existence our experience has been rather costly. We have had educated in the various institutions supplied by Government hundreds of young men who have for the past few years found that their energy has been uselessly taxed; for their learning and labour make no difference in their position and prospects, or have rather changed these for the worse. We see on all sides a crowd of young men who have received a more or less liberal education, and who are whiling away their time in applying to the heads of several departments for employment. They curse their fate, which has left them unprovided for after a bootless labour of some ten or twelve years. They have a smattering knowledge of several subjects, but they have gone deeply in none, and even that smattering knowledge of theirs proves of no avail to them in the severe struggle for life that is going on around us. They find that their knowledge is of no help to them in the world where practical training is all that is respected. We do not mean to disparage liberal learning. Its importance and value have been for ages

[1] This is evidently a mistake.

recognized by all men. It is not for us to speak ill of it. It is beyond our power. We do see its benefits in our midst. How can we then speak in a disparaging tone of it? But we can say that liberal education is a costly thing, and, for those who have to labour very hard for winning their bread, it is useless. It is an ornament, and as such those only who are in easy or affluent circumstances can derive advantages from it. The greater majority are doomed to walk in humbler sphere of life which demands high training of a special kind, and hence, after an experience of the last 25 years, people are now beginning to see that greater attention must now be paid to this practical training which will fit men to their avocations in life, and which will, moreover, enable them to introduce improvements in industries and handicrafts.

A wave is passing over the country, agitating the minds of the people and drawing their attention to this subject. There is a stir on all sides—a stir which promises to result in some practical steps being taken to remedy the evil. The Bengalee, the Madrasee, and the Bombayite, each is now trying, to the best of his power and ability, to suggest a solution of this great educational problem of the day. But the movement is stronger on the Bombay side. Why, even ordinary men, from whom you would never exact any active interference in the public movements of the day, are coming forward with proposals for the establishment of technical schools.

The Education Commission on technical education.

9. Most questions of importance regarding education in India are fully and lucidly handled in the report of the Education Commission, but the subject of technical instruction is an exception to the rule; for technical instruction was one of the few matters connected with education on which the Commission was not required to report. It is true that in the resolution appointing the Commission, attention was called to the one-sidedness of the existing system of secondary education, and that the Commission, in response to that call, proposed a bifurcation of the curriculum in high schools,—one course leading to the University, and the other fitting boys for commercial pursuits; but this is only touching the outer fringe of the great question with which it is now proposed to deal.

The other matters were the Universities and the education of Europeans and Eurasians.

Recommendation of the Education Commission regarding practical training in schools.

10. Although the Education Commission were thus not required to discuss the subject of technical training, their comprehensive report could not entirely ignore a question which was rapidly growing in importance in public estimation. Accordingly in the Commission's Report certain observations * on the subject occur, which it is desirable to quote in this place :—

* Education Commission Report, pages 219—22.

> Throughout India high schools have hitherto been regarded, not only or chiefly as schools for secondary instruction, intended for pupils whose education will terminate at that stage, but in a much greater degree—it may almost be said exclusively—as preparatory schools for those who are to become students of the University. It has been seen that middle schools comprise two well-marked classes,—those in which the scheme of studies is, and those in which it is not, governed by University standards. With one exception,† which will be presently noticed, no such distinction exists in the case of high schools, in all of which the course of instruction is determined by the matriculation standard, which, again, is arranged solely with a view to subsequent University studies. One of the questions put to witnesses before the Commission ran as follows: "Is the attention of teachers and pupils in secondary schools unduly directed to the Entrance Examination of the University?" The replies to this question are singularly unanimous. It has been felt in all provinces, and urged by many witnesses, that the attention of students is too exclusively directed to University studies, and that no opportunity is offered for the development of what corresponds to the "modern side" of schools in Europe. It is believed that there is a real need in India for some corresponding course which shall fit boys for industrial or commercial pursuits, at the age when they commonly matriculate, more directly than is effected by the present system. The University looks upon the Entrance Examination, not as a test of fitness for the duties of daily life, but rather as a means of ascertaining whether the candidate has acquired that amount of general information and that degree of mental discipline which will enable him to profit by a course of liberal or professional instruction. In these circumstances, it appears to be the unquestionable duty of that Department of the State which has undertaken the control of education to recognize the present demand for educated labour in all branches of commercial and industrial activity, and to meet it, so far as may be possible, with the means at its disposal. The Honourable Mr. Justice West, Vice-Chancellor of the University of Bombay, has expressed his views on this point in the following terms: "The preparation for ordinary business may with advantage proceed up to a certain point along the same course as that for literature and science. It is a defect of our system, as I understand it, that it does not provide for a natural transition to the further studies which may be the most proper for a man of business, nor even propose to encourage and conduct such studies. When a boy reaches the age of about fourteen he may have plainly shown that he has not the gifts that would make him a good subject for literary culture. His tastes or his circumstances may disincline him to be an engineer or chemist. He ought not then to be forced on in a line in which failure is almost certain. He should be put to work on matters that he really can master, unless quite exceptionally dull, such as arithmetic, rudimentary economics, mercantile geography, the use of manures, or others determined by the locality of the school and its needs. . . . The extension of this knowledge should be along those lines where it will be grasped and incorporated by

† The reference is to classes in drawing and agriculture attached to some high schools in Bombay.

the interests and teachings of active life. Still it should be education, aiming at making the mind robust and flexible, rather than at shabbily decking it with some rags of 'business information' or low technic skill. For these different aims, the present system makes no sufficient or distinct provision."

We do not attempt to define the course of instruction which might be imparted in schools of the kind suggested. The Departments in many provinces have dealt satisfactorily with the question of independent courses in middle schools; and it may well be left to them, in consultation with school managers and others interested in education, to determine the character and constitution of similar schools of a more advanced kind. Indeed, to attempt to fix a course for "independent" high schools would be to fall into an error of precisely the same character as that against which the proposal is directed; it would be to substitute one uniform course for another. But what is now chiefly needed is variety; so that the educational system as a whole may be such as more fully to meet the needs of a complex state of society. Nor would the introduction of the proposed alternative course into high schools involve any great expenditure; *for the bifurcation of studies need not take place until the student is within two years of the Entrance Examination, that is, until he has been eight or nine years at school.* His studies in the middle department will be sufficiently practical to prepare him for those he will take up in the modern side, sufficiently liberal to fall in with those of the academical side. It may be added that, with the establishment of these schools, full recognition would be given to the salutary principle that the course of instruction in schools of every class should be complete in itself. The Madras Provincial Committee draws attention to the fact that little more than half of those who pass the matriculation examination of that University proceed to the First Arts standard; and though the disparity is less conspicuous in other provinces—in Bengal indeed, it is stated that more than 90 per cent. of those who matriculate are admitted to colleges,—yet it is probable that in all provinces the institution of the alternative standard would meet the popular wishes and answer a real need. We therefore recommend *that in the upper classes of high schools there be two divisions,—one leading to the Entrance Examination of the Universities; the other of a more practical character, intended to fit youths for Commercial or non-literary pursuits.*

[The italics are not in the original. The present writer differs from the view expressed in so far as he is convinced that the bifurcation should take place earlier. On this point he agrees with the Madras Government, as will appear later on.]

Further on in their report the Commission recommend that a certificate of having passed by either of the alternative courses should be regarded as qualifying for the public service in its subordinate grades.

Policy of the Government of India on the subject of practical and technical training.

11. The preceding extract expresses the Commission's view as to the general direction to be followed in grafting a system of practical training on our present scheme of secondary instruction; but it will be observed that the training recommended was of a general or preparatory, and not of a technical, character. The Government of India however, in reviewing the Commission's Report, was desirous of giving the recommendation the fullest significance which could be attached to it; and, therefore, having previously secured the consent and support of Local Governments, His Excellency the Viceroy in October 1884 sanctioned the publication of a Resolution, from which the following passage is quoted:—

The bifurcation of studies suggested by the Commission is of special importance at the present time. Every variety of study should be encouraged which may serve to direct the attention of Native youth to industrial and commercial pursuits. To be of any value, the bifurcation should be carried out, as the Commission advise, in the High School course. To postpone it till after matriculation at the University, as proposed by some authorities, would to a great extent render its advantages futile.

The Government of India commends the other general recommendations of this chapter to the adoption of Local Governments. * * * * * Efforts should be made to call forth private liberality in the endowment of scholarships not only in Arts colleges, but for the encouragement of Technical Education.

Such was the policy which the Government of India, after a careful examination of the facts, promulgated on this question. That policy enforced the necessity of making the course of study in High Schools more practical than it was; and it recognized the desirability of encouraging technical instruction. Beyond such a recognition, however, the Education Commission or the Government of India did not then go. No indication was given of the direction in which, or of the means by which, such technical instruction might be imparted. In this note an effort is made to supply such an indication.

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## PART II.

Present condition of Technical Education in the various provinces of the Empire.

12. Before attempting to make any suggestions for the promotion of technical instruction in India, it is essential to form a conception of the present condition of Technical education in the various provinces, and of the steps which are being taken to improve that condition. The position on both points must be correctly appreciated before any proposals can be made in the way of modification or extension of existing arrangements. The following remarks, therefore, are intended to be as brief a statement as the subject will allow of the present position of Technical education in the various provinces of the Empire, and the nature of the steps which are being taken to extend and improve it.

No. 1. Technical Education in INDIA to 1886. (MADRAS)

13. Technical education may be divided into two classes—University education and school education. The following statement is intended to show at a glance the various classes of Technical colleges and schools already in existence, the number of institutions of each class, and the attendance at the close of the last school year :—

*Statement showing the condition of Technical Education in British India in 1884-85.*

| | UNIVERSITY EDUCATION. | | | | | | SCHOOL EDUCATION. | | | | | | | | | | | | CLASSES IN HIGH SCHOOLS IN | | | | GRAND TOTAL. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LAW. | | MEDICINE. | | ENGINEERING. | | SCHOOLS OF ART. | | SCHOOLS OF LAW. | | MEDICAL SCHOOLS. | | ENGINEERING AND SURVEYING SCHOOLS. | | INDUSTRIAL SCHOOLS. | | SCHOOLS OF AGRICULTURE. | | ART. | | AGRICULTURE. | | | |
| | No. of colleges. | Attendance. | Number. | Attendance. | Number. | Attendance. | Number. | Attendance. | Number. | Attendance. | Number. | Attendance. | Number. | Attendance. | Number. | Attendance. | Number. | Attendance. | Number. | Attendance. | Number. | Attendance. | Institutions. | Attendance. |
| Madras . . . | 1 | 127 | 1 | 124 | 1 | 19 | 1 | 162 | ... | ... | 5 | 197 | 1 | 106 | 6 | 249 | 1 | 96 | ... | ... | ... | ... | | |
| Bombay . . . | 2 | 244 | 1 | 277 | 1 | 102 | 1 | 251 | ... | ... | 3 | 257 | 2 | 98 | 7 | 307 | 1 | 46 | 36 | 2,713 | 8 | 289 | | |
| Bengal . . . | 8 | 649 | 1 | 132 | 1 | 42 | 1 | 157 | ... | ... | 7 | 672 | 5 | 278 | 5 | 172 | ... | ... | ... | ... | ... | ... | | |
| Punjab . . . | ... | ... | ... | ... | ... | ... | 1 | 85 | 1 | 71 | 1 | 188 | ... | ... | 4 | 93 | ... | ... | ... | ... | ... | ... | | |
| North-Western Provinces. | 3 | 111 | ... | ... | 1 | 155 | ... | ... | ... | ... | 1 | 89 | ... | ... | 2 | 186 | ... | ... | ... | ... | ... | ... | | |
| Central Provinces . | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 19 | 316 | ... | ... | ... | ... | ... | ... | | |
| Assam . . . | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 7 | 163 | 1 | 18 | ... | ... | ... | ... | ... | ... | | |
| Burma . . . | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 5 | 110 | 1 | 38 | ... | ... | ... | ... | ... | ... | | |
| Hyderabad Assigned Districts. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | | |
| Coorg . . . | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | | |
| Total . | 14 | 1,131 | 3 | 533 | 4 | 218 | 4 | 655 | 1 | 71 | 17 | 1,403 | 20 | 755 | 45 | 1,379 | 2 | 142 | 36 | 2,713 | 8 | 289 | 154 | 9,289 |

There is also a Forest School at Dehra Dun and one at Poona.

14. Before any comment is offered on the figures for each province, a comparison is invited between the statistics of technical instruction exhibited in the foregoing statement and the condition of education generally throughout the Empire. The latest educational returns show that the total number of pupils under any sort of instruction in Public (including Aided) Institutions in British India is about 3,095,000. Of these, about 2,665,000 pupils were under instruction in primary or rudimentary vernacular schools, in which practically no sort of technical training is given. The remaining 430,000 were receiving an education of a more advanced description, and three-fifths of them were learning English. But to only 6,287 of these 430,000 students was an education of a technical or professional character being imparted, whereby they could earn an independent livelihood.* If it be remembered that the vast mass of these students belongs to the lower middle classes, whose patrimony is chiefly their education; that the landed proprietors are not largely represented in our schools and colleges; that trade and commerce contribute no more than a tithe of the number of pupils, the full significance of the above figures will be appreciated, and the urgent necessity of giving to, at all events, some branches of our system of State education a more practical bent will be perceived.

Significance of the preceding statistics.

*There are 141 training schools for masters and mistresses, attended by 5,132 students; but these are mostly normal schools, intended to provide teachers for village primary schools. The number of children attending the Drawing and Agricultural classes in Bombay has also not been included, as the instruction is only rudimentary and not exclusively technical.

15. Turning from the main aspect of the statement to its details, some remarks may now be offered on the arrangements which exist for Technical Education in the Universities of the various provinces, beginning with Madras.

Condition of Technical Education in the Universities.

MADRAS PRESIDENCY.

Law.

The Madras Presidency contains only one School of Law,—that attached to the Presidency College. The degrees given are Bachelor and Master in Law; and to qualify for the Bachelor's degree, candidates must have obtained the degree of Bachelor in Arts. One hundred and twenty-seven students attended the school last year on payment of a term fee of Rs. 50 each. Fifty-seven students presented themselves for the B. L. degree, of whom only 24 passed, the result contrasting unfavourably with those of preceding years. Radical changes in the working of the Law classes were, however, sanctioned in 1884, and an additional Professor appointed. The work is divided between two Professors according to a scheme approved by the Department of Education, each Professor giving tutorial class instruction as well as instruction by lectures. The latest Educational Report states that these changes are calculated to "produce substantial results by raising the general legal knowledge throughout the Presidency." It would seem, then, that no further improvement is immediately called for in regard to the Faculty of Law in Madras.

16. The Madras Medical College, established as a Medical School in 1835, was raised to the status of a College in 1851, and affiliated to the Madras University in 1877. Its certificates are recognized by the Colleges of Surgeons of London, Edinburgh, and Dublin—a recognition which, it is stated, induces many students to proceed home for their degrees in preference to graduating in the Madras University. The College has a senior division leading to the University degree, and a junior division for the education of the apothecary or medical practitioner class. Last year the senior division contained 120 male and 4 female students; the junior division contained 91 students, 7 being females. The instruction is stated to be all that need be desired; but the number of candidates for degrees has hitherto been very small, owing, it is stated, to the preference shown for British degrees.

Medicine.

17. The Madras Civil Engineering College consists of two departments—the Collegiate and the School Departments. After a prolonged discussion, the College was reorganized last year. The object of the Collegiate Department (which was established in 1862) is to train students, who have received a liberal education, for employment as Engineers or for the degree of B. C. E. in the Madras University. There is also a Mechanical Engineering class. One engineer's appointment in Government service is guaranteed annually to the College; but still the College is quite local in its effects, and the Public Works Department of the Government of India knows very little about its results. In all Departments the course seems to be wholly theoretical, which is a serious defect.

Civil Engineering.

The School Department trains students for the subordinate engineering posts under the Public Works Department, Local Funds, Municipalities, and there are also classes for surveyors and draftsmen. The upper subordinate (*i.e.*, school) students have a year's practical training after leaving the school before appointment to the public service.

The average number of students on the roll of the Collegiate Department last year was 19 and in the School Department 106. These numbers are an improvement on preceding years, and the Report for 1883-84 stated that applications for admission to the Collegiate Department are more numerous than the accommodation and teaching capacity of the Institution can meet. The popularity of the College is said to be increasing, while students of merit are reported to find no difficulty in getting employment. The great want seems to be facilities for practical training, which, having regard to the existence in Madras of large railway termini and workshops, ought not to be insurmountable.

## BOMBAY PRESIDENCY.

18. There are two Schools of Law in the Bombay Presidency,—the Government Law School and the Law Class of the Deccan College. The foundation of the former is due to a subscription raised to perpetuate the memory of Sir Erskine Perry, formerly Chief Justice of Bombay, and for many years President of the Bombay Board of Education. The Law classes of the Deccan College were established in 1884 with the object of enabling students of that College to keep some of their law terms while undergraduates. Both Schools are affiliated to the University; but the lectures in the Deccan College deal only with the introductory subjects, which form the first year's course in the Government Law School. The students attending the Law School number 180, while those attending the class in the Deccan College number 64. The Government School of Law at Bombay seems to be on a satisfactory footing, but the following rather scant notice is all that appears in the last Education Report regarding it:—

Law.

> Seventy-nine candidates presented themselves for examination, of whom 54 successfully passed it. Thirty-four candidates presented themselves for the LL. B. Examination of the University of Bombay, of whom 13 passed.

19. This College was established in 1845 as a tribute to the memory of Sir Robert Grant, who was Governor of Bombay. It was affiliated to the Bombay University in 1860 as a College for Medical education. Its students are divided into two classes—those who are educated for the University degrees, and those who are educated for the grade of Apothecary; the former numbering last year 277, and the latter 76. Besides these, there were 17 female students. Dr. Cook, the Principal, in reviewing the events of the thirty-ninth year of the existence of the College, remarks as follows:—

The Grant Medical College.

> It is hardly needful for me to point out how great a boon the institution of a Medical School such as this has proved to the rapidly-growing city, whose need of medical aid has annually increased with its increasing numbers, and which, while, on the one hand, it has tendered its plea for extended assistance from skilled medicine, has on the other, preferred its educated sons as students in such numbers that the College is taxed almost beyond its strength and resources to meet the demands on its teaching capacity. The annual reports for several years have with pleasure and some pride adverted to this steady extension, showing that, while so late as the year 1868 the number of matriculated students was only 20, it has during the past five years averaged 66, and that during the last quinquennial period 2 alone of the 104 students have passed out to swell the ranks of the qualified medical practitioners of Bombay. Amongst these, as indeed among their predecessors, there have been many who have most worthily acquitted themselves as students, and become fitted to support the character and dignity of the profession which has admitted them into its membership. The test afforded by the examination instituted by this University before conferring its degree in Medicine is a searching and satisfactory one; and all who succeed in being placed in the first or honour division at their final examination, may fairly be considered to be qualified to take their place in the higher ranks of Medicine.

In commenting upon Dr. Cook's Report, the Director of Public Instruction observes as follows:—

> Dr. Cook observes that the College is taxed almost beyond its strength to meet the demands on its teaching capacity, and he looks forward to the day when a College of experimental science, with laboratories fitted for scientific experiment and research, shall be founded in Bombay. But in the meanwhile the need for assistant teachers, especially in Anatomy, is acutely felt. Hardly less essential than the increase of teaching power is the need for enlarged accommodation; and the addition of another wing to the College, and of two extra rooms to the Obstetric Institution, is represented as a pressing want.
>
> Of the 370 students borne on the rolls, 112 are Christians, 143 Parsis, 107 Hindus (including 50 Brahmans and 35 from the trading castes), 3 Jews, and only 5 Mahomedans. All classes of the community, except the cultivators, are fairly represented. Government and Native State officials contribute 50, pensioners 25, merchants 54, and the priestly caste 25. Sons of persons of property are returned at only 12. The wide representation of all classes of the community is a satisfactory feature, and the practical benefits conferred on the community, as illustrated by the large attendance at the College, afford the best justification for the additional accommodation and increase to the teaching power asked for by Dr. Cook.

The Grant Medical College seems to be a well-managed and successful institution sufficient, with such improvements as the Government of Bombay may make from time to time, to meet all the requirements of the higher medical education in the Western Presidency.

Civil Engineering.

20. The Poona College of Science, formerly the Poona Civil Engineering College, arose out of a school established in Poona in 1854 by Government for the purpose of educating subordinates for the Public Works Department.

The College is divided into four departments—

(a) Matriculated students studying for University degrees in civil engineering.
(b) Matriculated students studying scientific agriculture in the College and the farm attached to it.
(c) Matriculated students who study Forestry.
(d) Students studying in the College and attached to workshops with the object of becoming overseers, etc.

Attached to the Engineering College are extensive workshops, which have from time to time been extended from the profits made on works executed in them. In these workshops practical instruction is conveyed, and work of various kinds executed for Government and the public. The University of Bombay requires candidates for the L. C. E. Degree to perform manual work before the examiners; and this secures for the students in the College a course of practical training noticed as wanting in Madras. The students in the lower or School classes, who become overseers, etc., have to go through a workshop course of from 2 to 4 years' duration, and it is by them that the work in the shops is chiefly executed. The attendance at the Engineering College last year was 103, and the Engineering School 67. Regarding the University classes, the following passage is taken from the last Report of the Director of Public Instruction:—

> Fourteen students appeared for the L. C. E. degree, of whom 7 passed—1 in the first class, 1 in the second class and 5 in the pass class. Twenty-nine students appeared for the F. C. E. Examination, of whom 25 passed—2 in the first class, 11 in the second class and 12 in the pass class. There was a large number of entries in the Junior Engineering class after the late Matriculation Examination, and several promising students have joined the College from the Province of Mysore. The Bangalore Engineering College has been abolished, and the Mysore State finds it advantageous as well as economical to send pupils here, the State paying to certain selected pupils liberal stipends to enable them to live comfortably in Poona and pay their College fees. The men thus sent are, of course, picked men. I can speak in the highest terms of their intelligence and industry, and their education prior to their joining this College has been most carefully conducted. I believe that somewhat similar arrangements will be made in the Nizam's State, and that, instead of keeping up an Engineering College at Hyderabad, Deccan, a few of the best youths will be selected by the State, sent to this College, and employed by the State on the completion of the course of study. I think the system will be advantageous both to the youths who are thus educated and to the States which will subsequently find them employment. The enlargement of ideas which will necessarily follow a removal from the narrow sphere in which these youths have been accustomed to move cannot fail to produce a beneficial and lasting effect on them. The pupils of this College first obtained a footing in Mysore nine years ago, and three of its alumni who went to Mysore between the years 1875 and 1876 are now Executive Engineers in charge of districts, and in receipt of salaries of Rs. 400 per mensem.

Two appointments annually to the Engineering Establishments of the Government are guaranteed to this College, which, as far as can be judged, may be pronounced to be on the whole quite abreast of the requirements of the time and place.

## BENGAL.

Law Schools.

21. In six Government* and in two independent Colleges† 649 students are reading Law. Owing to the competition of the independent Colleges which are situated in Calcutta, the Law classes in the Presidency College were closed in 1884. This is the first instance of private enterprise in educational matters actually beating the Government out of the field. The number of candidates for the degree

* Hooghly, Kishnaghar, Dacca, Patna, Rajshahye and Cuttack.

† Metropolitan Institution and City College.

Bachelor of Laws in the last year reported on was 140, of whom 77 passed. The percentage of successful candidates indicates that the instruction conveyed is fairly satisfactory, and the opportunities afforded for learning Law seem at present to be adequate.

Medical College, Calcutta.

22. Originally the preliminary standard of education qualifying for admission to the Medical College was the University Entrance Examination, as it still remains at Madras and Bombay. But about ten years ago the standard was raised from the Entrance to First Arts Examination. The immediate consequence was a great reduction in the number of students. In 1878, when the new standard of preliminary education became familiar, the numbers began to rise again. But then, with the object of raising the standard of attainments, a new rule was passed that each candidate must pass in every subject, and not merely obtain a certain number of marks on the aggregate of subjects. The enforcement of this rule also brought about a fall in the number of students during the next few years (1879—1882), though probably a decay in the demand for medical practitioners had also some effect. The numbers, however, have since increased, and now stand at 132, while the standard and professional attainments of the students have been greatly raised.

During 1883-84 female students were admitted to classes for study for M.B. or L.M.S. The question of their admission had been discussed previously; but, owing to the attempt made to allow them admission with a lower preliminary test of general education, the scheme fell through. They are now admitted on equal terms with male students.*

* Female students are admitted on a lower preliminary educational test to the Medical School, which prepares men of the hospital assistant or general practitioner's class.

The course of instruction for M.B. and L.M.S. now extends over five years; and during 1883-84, of 28 candidates for final examination, 10 passed. During 1884-85 a considerable increase in the number of students for medical instruction at the Medical College took place.

In the Medical College School military pupils of the Apothecary class are also educated, and at present the class numbers 60 pupils. This subordinate class has also been thrown open to women, of whom there are now thirteen students attached to the College.

Some women are also instructed in Midwifery in the adjacent Eden Hospital, and pass out annually as qualified *dhais*, or midwives.

Civil Engineering.

23. At the Seebpore College near Calcutta candidates for the degree of Civil Engineering have to go through a four years' course of theoretical training, with which some practical work is combined. During this period they spend three hours daily during term in the carpenter's and pattern shop, smithy, foundry, or fitting shop. Part of the last year's course consists of practical brick-making in the Government brick-fields at Akra; and of practical work in stone masonry, brick-laying, managing workmen, and keeping accounts. Those who are selected for Government employment have to spend another year in the Department without pay as probationers, but they are distinguished students, who are generally in the receipt of Government scholarship.

Besides the collegiate course described above, there are courses for Mechanical Engineers, Civil Overseers, and Mechanical Overseers. These courses follow generally the outlines of the course for L.C.E. with appropriate modifications.

Last year the number on the rolls of the College Department was 42; and on the rolls of the Subordinate or Apprentice class 107. The Principal of the College reports that considerable apathy still prevails among the students; but, on the other hand, it is stated that those who have passed through the College or School find little difficulty in getting employment.

## North-Western Provinces and Oudh.

Law.

24. The information available is somewhat meagre: but it is gathered that there are three Schools of Law attached, respectively, to the Benares, Muir, and Canning Colleges, which are affiliated to the Calcutta University. The Benares Law School was opened in 1884, and consists of 17 students, who defray the whole cost of the lectures. The Law classes of the Muir College are attended by 31 students, while 57 students attend those of the Canning College at Lucknow.

Engineering.

25. The Thomason Civil Engineering College at Roorkee, founded in 1847 by Mr. Thomason, then Lieutenant-Governor of the North-Western Provinces, and affiliated to the Calcutta University in 1864, was first designed to supply the Department of Public Works and Survey Departments with Assistant Engineers, Overseers, and Sub-Overseers. It is now, however, open to the public. The College contains three classes:—(*a*) Engineer Class; (*b*) Upper Subordinate Class; (*c*) Lower Subordinate Class. The Engineer Class is open to Europeans and Statutory Natives of India, who have passed the Entrance Examination of the University or other similar test. The students go through a two-years' theoretical course, during which they receive practical instruction in surveying and preparing projects. After the two-years' course is over, students are eligible for appointment as Engineer apprentices, so far as vacancies are available, and are supposed to undergo a practical training. After being favourably reported on, selected students are appointed Assistant Engineers in the Department of Public Works, four or five appointments of the sort in alternate years being attached to the College. It is stated that some very valuable Engineers have been turned out of this College. Their instruction in surveying is most thorough. They exhibit great skill in managing native workmen and in applying the resources of the country.

The Upper Subordinate Class also consists of students who have qualified by a preliminary literary test. They have two years' theoretical course in the College, and afterwards one year's practical training. This class includes non-commissioned officers from British regiments, as well as "Natives" of India.

The Lower Subordinate Class are all Natives of India by descent, and a qualifying preliminary education is necessary for admission. Soldiers of the Native Army desirous of learning so much

surveying as suffices for reconnoitring purposes are received in this class without previous qualifying education. Generally the courses of study in the principal classes are varied, but include Mathematics, Civil Engineering, Surveying, Drawing, and Urdu, the extent read being of course different in each class. Besides, the Engineer Class learn experimental science and photography. The College also holds examinations and grants certificates of qualification as Sub-Engineer, Overseer, and Examiner of Accounts, Department of Public Works, to all candidates who present themselves, under certain rules. Several valuable stipends and studentships are attached to the College; and the numbers attending the various classes last year were—

| | |
|---|---|
| Engineering Class . . . . . . . . . . . . . . . . | 21 |
| Upper Subordinate Class . . . . . . . . . . . . . . . | 78 |
| Lower Subordinate Class . . . . . . . . . . . . . . . | 43 |

There are no workshops attached to the College; but in the neighbourhood are situated the well known Roorkee Workshops belonging to the Local Government. The students visit these, but they do not perform manual labour there, as at Seebpore and Poona. Their visits, therefore, are practically of little value. It is understood that there is some idea of disposing of these workshops as unnecessary for Government purposes. But preferably it is submitted they should be made over to the College, and a system of practical training added to the theoretical course.

26. Before passing on to Technical Instruction in Schools, the following statement, compiled from the University Calendars, is presented. It shows the number of degrees granted by each University since its foundation in the three faculties of Law, Medicine, and Engineering:—

*Statement showing the number of persons who have taken degrees in Law, Medicine, and Engineering, in the Universities of Calcutta, Madras, and Bombay.*

| Names of Universities. | NUMBER OF PERSONS WHO HAVE TAKEN DEGREES IN | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LAW. | | | | | | MEDICINE. | | | | ENGINEERING. | |
| | D. L. | Honours in Law. | B. L. | LL B. | LL D. | M. L. | M. D. | Honours in Medicine. | M. B. | L. M. S. | B. L. E. | L. C. E. |
| Calcutta . . . | 8 | 6 | 1,052 | ... | 262 | ... | 5 | 8 | 89 | 465 | 27 | 92 |
| Madras . . . . | ... | ... | 231 | ... | ... | 7 | 5 | ... | 11 | 29 | 38 | ... |
| Bombay . . . | 1 | ... | ... | 131 | ... | ... | 2 | ... | ... | 170 | ... | 117 |
| TOTAL . | 9 | 6 | 1,283 | 131 | 262 | 7 | 12 | 8 | 100 | 664 | 65 | 209 |

Technical Education in Schools.

27. The preceding remarks will have given an idea of the condition of Technical Education of the higher or University character in the various Presidencies which possess colleges, affiliated to a University, in which the higher instruction is imparted. The following observations are concerned with the condition of Technical Education of the lower or school order:—

MADRAS PRESIDENCY.

School of Arts.

28. In the Report on Public Instruction for 1883-84, the aim of this school is declared to be the development of those industrial arts which have for their end the construction and decoration of the articles, whether of metal, wood, stone, or clay, which are required by the exigencies of modern life in India. The attendance at the school, which in 1883 was 147, rose in 1884 to 162, and it is stated that "a further advance in strength is expected to take place when the scope of the institution is enlarged, and the services of a competent assistant to the present Superintendent are secured."

The Madras Education Report goes on to speak of the school as follows:—

> A pleasing and novel feature in the year's history is that the Institution is beginning to fulfil its chief object—the supply of skilled labour for various arts in districts—some students having obtained suitable employment. The engagement of one as a designer of textile fabrics in a coral firm is specially gratifying, for it is in relation to improved design that the school is calculated to benefit the industries of the country. Instruction in free-hand was more successful than that in geometrical drawing, the failure in the latter subject being probably due to the low general educational standard of most of the students.
>
> Useful instruction has been given and progress made in wood-carving, engraving, metal-work, and in the manufacture of stained glass windows, the students having been instructed in the process of execution as well as of design.
>
> The Institution seems to have been very active in its manufacturing branch, turning out a quantity of high class work. Experiments too have been made in various directions as regards pottery, and valuable information collected. The discovery of superior kaolin, uncontaminated by iron, near Salem, will, it is hoped, prove an important one.

The expenditure amounted to Rs. 28,261-15-1, and the receipts to Rs. 43,615-5-8.

Medical Schools.

29. The information of a general or descriptive character available regarding the Madras mofussil Medical Schools is very scanty; but from the Education reports for the two last years it is gathered that these schools, five in number, are concerned with the training of the Apothecary class. The most flourishing school is that attached to the Madras Medical College. It is attended by 86 students, seven being females, and the progress made is reported to be satisfactory. The attendance at the Medical Schools situated at Royapuram and Nellore show signs of decrease, but the Tanjore and Madura schools were improving. On the whole, the schools, though apparently not very flourishing, seem to serve a useful purpose in Madras.

Engineering.

30. The only Engineering School in the presidency is the Junior Department of the Civil Engineering College, to which reference has already been made under the head of University Education. The course of instruction comprises elementary mathematics, engineering, surveying, drawing and estimating, bricklaying, and the Madras vernacular languages. One scholarship of Rs. 13 per mensem tenable for two years, five scholarships of Rs. 15 and ten of Rs. 10 each tenable for one year are attached to the school; and, besides these, ten studentships of Rs. 10 each per mensem are available for European non-commissioned officers and soldiers who join the school. The institution derives no revenue except from the State. The instruction conveyed in the school is believed to be too theoretical, facilities for practical work being deficient. Still, it is stated, that passed students of the school find no difficulty in getting remunerative employment either under Government or Local Boards or on Railways, and this fact tends to make the school popular and applicants for admission numerous. It is therefore a matter for regret that, owing to insufficient accommodation, all applicants for admission to the school cannot be received. An excellent feature of the organization seems to be a system of examination by which candidates, not being students of the school, appear and obtain on passing examinations certificates of competency as draftsmen and surveyors.

Industrial Schools.

31. There are six Industrial Schools in the presidency, three being situated in Madras, and three in the mofussil. The Madras schools, attended by an average of 60 students each, are well spoken of; but the other three seem unimportant. The following description by the Inspector of Schools of the Nazareth Industrial School in Madras, attended by 61 pupils, seems to indicate that, as educational institutions, the best of these Industrial Schools is at present of little value :—

> In addition to the above articles (chairs, despatch-boxes, etc.), the boys have assisted in making the roofs of six different buildings, and they are being taught to make wheels for country bandies, spinning wheels, and ploughs. Three boys have a fair knowledge of blacksmith's work, and they can make knives for planes, chisels, and nails. It is very desirable to develop this trade and to build a smithy, in connection with which coppersmith's work might perhaps also be carried on.
>
> The tailor boys can (most of them) work the lock-stitch sewing machine. Some of them have recently commenced a little embroidery work in gold and silk thread. I saw them cutting out and stitching ordinary articles of dress, such as short coats, etc., and am glad to say that they worked very neatly.
>
> A new loom has been built for the weaver boys, and there are now five looms at work. There is a good demand and ready sale for the cloths woven here. Cloths of different patterns are being made in this department; some of them are very nice indeed. A machine for winding the yarn has recently been made and is now in use.
>
> Fourteen of the girls learning to make pillow lace are orphans. I learn that specimens of the lace turned out by these girls have been sent to the Needlework Exhibition held in Madras in connection with the National Indian Association.

Agricultural Schools.

32. Madras and Bombay share the distinction of being the only provinces of India which have Schools of Agriculture. India is pre-eminently an agricultural country: the vast mass of the people are agriculturists; the Government derives a third of its revenue from the land; but hitherto only in Madras and Bombay has any effort been made to give instruction in a subject which so intimately concerns the welfare of the Government and the people. Madras has had an Agricultural School for some years, from which, since its establishment, nearly 100 students have passed out. It is stated that the passed students of the school are in request, and that the school is now being regarded as an avenue to remunerative employment. The course of study is varied, consisting in the different classes of arithmetic, book-keeping, geology, physical geography, mechanics, hydrostatics, agriculture, practical farming, surveying, veterinary, and hospital practice. It is stated that Native States and Local Bodies provide stipends for a certain number of students of the school and that a considerable proportion of the students come of agricultural families. Last year the number of students on the rolls was 95, which is an improvement on the preceding seasons. Judging by the recent examinations, also, the educational attainments of the students are higher than in previous years; and the reports submitted to the Local Government are stated to afford evidence of careful teaching. The least satisfactory feature in connexion with the school is its financial aspect. "The expenditure," says the Education Report for 1884-85, "amounted to Rs. 39,242-5-0, and the receipts from fees, etc., to Rs. 622-14-2. The disproportion is very great, though considerable allowance must be made for a Technical Institution which cannot but be costly, specially during its early days, and until its certificates are of assured value in the competition for remunerative employment. When this condition is secured, it cannot be doubted that fees may be levied at rates which will suffice to cover a large portion of the cost."

33. Such then is the condition of Technical Education in the Madras Presidency at the present time. All told, the students of Technical Colleges and schools scarcely exceed 1,000 out of a school-going population of about 4¼ lakhs. The provision for Technical teaching in Madras is not

adequate to the requirements of the case, though the following remark of the Director of Public Instruction show that the present state of things in this respect is an improvement on the past:—

> During the last quinquennium the number of Technical or Special Institutions has more than doubled, and the attendance has nearly doubled. Under Art and Industrial Institutions some progress has been made, but not great; but further improvement, extensive and still more intensive, may be expected when the scheme for the development of Technical Education is brought into force, if it receive liberal financial support.

## BOMBAY.

*The Poona Engineering School.*

34. In connection with the facilities afforded in the Bombay Presidency for Technical training in schools, it may be well to begin with the junior or school department of the Poona College of Science, on which some remarks have already been made in connexion with University education. The following passage, extracted from the last Education Report of the Bombay Presidency, set forth the present state of things in regard to Engineering and Agricultural Classes, and besides indicates what are Mr. Lee-Warner's opinions on the broad question of Technical training:—

> The average number on the roll (of the Workshop and Sub-Overseer class) throughout the year was 77, with an average daily attendance of 62. The number of apprentices in the workshops at the close of the official year was 67, of castes and creeds as follows:—

| | | |
|---|---|---|
| 11 Christians | Europeans | 2 |
| | Eurasians | 2 |
| | Portuguese | 7 |
| 51 Hindus | Brahmans | 35 |
| | Artizans | 11 |
| | Parbhus | 3 |
| | Others | 2 |
| Mahomedan | | 1 |
| Jews | | 3 |
| Parsi | | 1 |

> This shows an increase of twelve on last year's attendance, and I am glad to report that the artizan class is better represented in the above table than it has been in any previous year.
>
> Thirteen apprentices completed their workshop course during the year. Of these, three left and obtained employment, while ten presented themselves in December last for the Entrance Examination of the Sub-Overseer class. All passed the Entrance test, and are now studying in the college for the Sub-Overseer's examination which will be held in January 1886.
>
> The Sub-Overseer class at the close of the year consisted of 15 students—an increase of one on the total of the previous year.
>
> * * * * * * * * * * * * * *
>
> Eight candidates were declared by the examiners to have passed the examination, and most of these have since obtained employment.
>
> The Principal dwells on the urgent need for adding to the staff of the workshop a foreman moulder, a pattern-maker, and other teachers of trades. The carpenter's shed also requires additions. Owing to the late pressure on the finances, these proposals have not yet received the sanction of Government; but I take the opportunity of pointing out the advantage of developing to the fullest extent the only higher class institution in the presidency which attempts to give mechanical training. We have abundant reasons for perseverance. The native State of Mysore and other feudatory States of India send pupils to the Poona College of Science, *and Brahmin pupils are showing a readiness to turn their hands to carpentering. There is thus a full supply of teachable material.* On the other side, the need for enlarging our present system of education and for giving it a more practical turn strikes me as the greatest need of the times. We have too many pupils turned out with a smattering of that class of education which aims at a University career. The notion that the education of the mind and the education of the hands are distinct and even contradictory prevails too widely in India. *A revolution in this state of popular feeling would be effected by the institution of Technical schools alongside of the ordinary Literary school for the practical instruction of those who must earn their living by the work of their hands. If this want is ever to be met the first need is an outturn of skilled and well trained teachers and foremen.* The Poona College, if properly fostered by Government, appears to me capable of laying the foundation of a great reform. If young Brahmin lads, who are fitted to be masters of our higher primary and our secondary schools, will only go through a course of mechanical instruction in the workshops, whilst they acquire a theoretical knowledge of various crafts in the lecture-room of the Poona College, we shall have solved the first of our difficulties, namely, the provision of competent teachers. We can then institute schools after the model of that at Rotterdam, which has been introduced into other parts of the Continent. The school there is on the half-time system, the morning being devoted to mental education, the afternoon to practical teaching in the workshop, and the course extends from the age of 13 to 16. The pupils learn drawing, mathematics, physics, chemistry, and the elements of various trades, the best practical workmen being engaged to teach these trades. *It appears to me that any enterprising municipality, which is the centre of various trades, would do well to institute a school of this sort in place of the uniform Lower Anglo-vernacular school which is copied*

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*everywhere. But, in the first place, teachers are wanted, and I would gladly see the workshop of the Poona College largely increased and the institution recognized as in part a sort of Technical Training College for teachers of a new class of technical secondary school of which every district should have one.*

The Poona College is perhaps too ambitious, but in our present experimental stage that is inevitable. Some attempt has been made in this presidency to give a practical turn to our higher education by the creation of agricultural classes in High Schools. The programme which I have sketched above for a course of mechanical instruction is already realized to some measure in regard to agriculture. The class at the college consisted of 46 pupils studying agriculture, of whom 8 passed. It is proposed that the University should establish a degree or license in agriculture, which would open to the successful candidates certain revenue appointments at present reserved for graduates of the University. Meanwhile employment for the passed students is found partly in the department under the Director of Agriculture, and partly in the schools to which an agricultural class is attached.

The various castes and classes of the community are very fairly represented in the college. Brahmins as usual contribute the largest quota, *viz.*, 142 out of 235 on the rolls. Other Hindus number 48, Christians 29, Parsis 11, Jews 4, and of Mahomedans there is only one. There are 17 sons of cultivators, and 26 sons of persons of means. Government officials contribute 63 to the attendance: but almost every class of the community is represented in one department of the college.

Engineering Class, Hyderabad (Sind) High school.

35. An Engineering class has been started in connexion with this School, the attendance last year being 21. The progress made has not yet been very encouraging, the students especially showing but little aptitude in practical levelling and surveying. Steps are being taken to improve matters, and it is to be hoped that this very interesting experiment to graft on technical training to the High School system will be persevered with. The teaching staff at the school seems to be weak.

Bombay School of Art.

36. The next institution for technical instruction in the Bombay Presidency, to which attention may be called, is the Sir Jamsetji Jijibhai School of Art, in regard to which Mr. Lee-Warner in his Education Report for last year speaks thus :—

The attendance returns for the last three years are—

| | Number on the rolls at the end of the year. | Fee receipts. |
|---|---|---|
| | | Rs. |
| 1882-83 | 184 | 1,796 |
| 1883-84 | 212 | 2,149 |
| 1884-85 | 251 | 2,349 |

The following table indicates the subjects of instruction in the school, and also the distribution of the pupils through the various classes :—

| | 1883. | 1884. | 1885. |
|---|---|---|---|
| Elementary School | 158 | 179 | 209 |
| Architectural Drawing Class | 21 | 15 | 23 |
| Painting Atelier | 12 | 23 | 18 |
| Sculpture Atelier | 9 | 8 | 8 |
| Wood-engraving Department | 5 | 2 | ... |
| Pottery Department | 16 | Nil | ... |

The returns for the grade examinations for the last three years are as under :—

| | 1st Grade. | | 2nd Grade. | | 3rd Grade. | | Total. | |
|---|---|---|---|---|---|---|---|---|
| | Presented. | Passed. | Presented. | Passed. | Presented. | Passed. | Presented. | Passed. |
| 1882-83 | 343 | 92 | 75 | 44 | 9 | 3 | 427 | 139 |
| 1883-84 | 463 | 159 | 75 | 24 | 24 | 4 | 562 | 187 |
| 1884-85 | 507 | 151 | 77 | 42 | 23 | 8 | 607 | 201 |

The statistics show the continued extension of the influence of the School of Art over High Schools, not merely in the presidency, but even outside its limits. The figures are at

first sight misleading without fuller explanation. Two classes of candidates are included in the above table,—those educated in the Bombay School of Art, and those educated elsewhere but brought under the test of its examination. The larger figures given in the second table above include candidates from the mofussil Middle Class Schools. With a view to introducing drawing more generally into the school course, Government laid down in January 1880 a course of instruction called the 1st grade Art, which included freehand drawing, model and object-drawing, and practical geometry. For more advanced students, a 2nd grade Arts course was prescribed, including the subjects given above, and linear perspective and delineation of diagrams on the blackboard. The time has now come when the standard may fitly be raised, as prizes are awarded to all who pass the standard of excellence prescribed. It is very satisfactory to note that under the stimulus of these small prizes, and in consequence of the facilities afforded by the supply of teachers sent out from the School of Art, no less than 33 schools, besides the School of Art, supplied competitors. A few of these were aided schools, and some were schools outside the presidency, such as the Nagpur Normal School, the Bhuj and Rajkot Schools of Art, the Kolhapur and Baroda School, and the Amraoti High School. The value of the addition of drawing, and of the facilities offered for teaching and examining it by this Department, are thus recognized, not only in the Native States, but in the Berars and the Central Provinces. I hope that in time these States will contribute their share to the cost of the examination and of the prizes; but meanwhile, beyond raising the standard, I have taken no steps to check the widest distribution of this small attempt at introducing a demand for some accomplishment not directly connected with the University degree course.

Returning from this explanation to the figures showing the work done in the School of Art, I notice that the examiners report a slight improvement in the freehand drawing of the elementary schools, while in model drawing the high standard attained last year has been maintained. The drawings in geometry were considered to show the conspicuous care devoted to instruction in this subject, and the work in perspective was pronounced exceptionally good. In the works submitted, showing outline of ornament in low relief from the cast, a decided improvement was observed; but in foliage drawn from nature there was a slight advance noticed in the work of the year. In the sculpture atelier a falling-off was observed. In the architectural drawing class there were 23 students, of whom the lecturer, Mr. Adams, reports that they have made very great progress both as draughtsmen and in the knowledge of architecture.

I attach great importance to a scrutiny of the various classes and castes which attend the different classes of institution. The conspicuous absence of Mahomedans and the paucity of Christians in the Arts Colleges and even in the High Schools afford indications that what may be called the University course does not attract these classes of Indian society. It is therefore satisfactory to notice that in the School of Art the overwhelming preponderance of a single caste, which has been observed in the Colleges, does not exist. The average daily attendance in the School of Art has been 148, but altogether 378 students attended the School at one time or another during the year. Of these, 200 were Hindus, 53 being sons of artizans, 24 the sons of cultivators, and only 52 Brahmins. There were 14 Mahomedans, 83 Parsis, 68 Christians, and 13 Jews. Of the Christians, 28 were Europeans, 5 Eurasians, 34 Portuguese, and one a native convert. This distribution is satisfactory, as showing that the school meets a need in all classes of society, and the instruction it affords in the technic art of architecture and the phonetic arts of sculpture and painting may be expected to produce a widespread influence in the future.

High School Classes in Agriculture and Drawing.

37. The tabular statement presented in paragraph 13 of this Note will have shown that Bombay alone of Indian provinces has in any way anticipated the bifurcation of studies commended by the Education Commission by introducing Agricultural and Art classes into High Schools. In connection with the High Schools at the places noted in the margin, Model Farms have been established, and Agricultural classes designed for the children of agriculturists, who are encouraged by scholarships of the value of Rs. 4 a month to attend the Model Farms for instruction in practical agriculture. The course includes chemistry, physics, botany, physical geography, and geology; besides which the student may take up land surveying and physiology. The following observations of the Director of Public Instruction in his last report will show what is being done in this direction:—

Dhulia, Ahmednagar, Belgaum, Nasik, Sholapur, Surat, Hyderabad (Sind), and Nadiad.

The review of the work done in the Agricultural classes would more conveniently follow the remarks given on the College of Science. It is through the supply of the teaching material prepared in the College of Science that it became possible to graft instruction in agriculture on the High School's course. There is a small but steady improvement in the results attained from year to year. That we have not attained larger results is due in some measure to the want of adherence to the scheme sketched out by His Excellency Sir Richard Temple. Original designs are apt to be forgotten when the construction is completed, and therefore it will not be out of place to recall attention to the design prepared in 1878. It was expected that the University would give a degree in Agriculture, and that the students attending the Agricultural classes of the College of Science would partly be studying for a University degree, involving a course of three years' study, and partly aiming at a College certificate to be given after two years' study in the College. During the past year some advance was made in laying before the University a scheme for a degree in Agriculture. The subject is still under their consideration; but I am inclined to think that the first essential to that result has not yet been fulfilled, namely, the addition of a Model Farm to the College of Science. In regard to

the second part of the scheme, the College certificates have gained a marketable value from two causes—first, certificated masters are thus rendered available for the High School classes; and, secondly, the creation of an Agricultural Department has directed the attention of those who are entrusted with its patronage to the High School classes. The High School classes were intended to be special classes of the ordinary High School in which education in agricultural chemistry, in botany, and in surface geology might be given to boys willing to receive it, who would be excused certain lessons in the ordinary course. According to this plan, the boys thus learn something in school about crops, manure, soils, stock, and implements, whilst attached to the school is a small farm in which they may practise the principles acquired in the school-room.

38. Notwithstanding that the attendance at the drawing classes is voluntary, already 2,713 pupils are under instruction. The classes are attached to Government schools alone, but students of other schools are encouraged to attend them. Certificates of two grades are given; and school-masters who hold the qualifying certificates and teach drawing in their own schools receive an additional grant. On the subject of drawing classes, Mr. Lee-Warner has the following remarks:—

Five new drawing classes were started and one closed during the year under report, and the number of children taught is increased from 2,234 to 2,713.

* * * * * *

The new classes were opened as follows: two in Aided schools, one in a Government school in Sind, another in the High School at Baroda, and the fifth in the Amraoti High School in the Berars. When it is borne in mind that the change in our system was only commenced in 1880, and that in the first year of its operation but one school outside the city of Bombay joined in the scheme, then its extension to Amraoti, Baroda, and Nagpur in the interval of four years may be regarded as an encouragement to those who desire to introduce into our Secondary Schools a more varied type of instruction than that which obtains marks in the University Examination.

Later on something will be said on the desirability of making drawing an obligatory subject in all Middle and High Schools, if we cannot at present go lower down. The importance of drawing as an essential requisite for and introduction to all systems of Technical training has been greatly accentuated by the recently published Report of the Royal (English) Commissioners in Technical Instruction.

Bombay Medical Schools.

39. It remains to state the condition of things in Bombay in regard to Medical and Industrial Schools. Omitting mention of the Subordinate Medical School attached to the Grant College, the Medical Schools are three in number—one at Poona, one at Ahmedabad, and one at Hyderabad (in Sind). The following remarks taken from the Director's Report indicate that, while there is room for improvement as far as the attendance at these Schools is concerned, the general prospects are not discouraging in this very important branch of Technical training:—

The attendance in the Byramji Jijibhai School at Poona has fallen from 57 to 52, while that at Ahmedabad has risen from 52 to 63. The attenance in the Hyderabad School has also risen from 38 to 49. At the Poona School 9 pupils passed in the first year's course and 12 in the second year's course at each examination, while at the final examination of pupils in their third year 22 passed. Amongst the students are three Mahomedans. Dr. Cook reports that the general conduct of the pupils was on the whole good.

The Ahmedabad School has entered upon its sixth year, and at the closing examination 13 passed out, 16 passed in the second year and 20 in the first year's course. Dr. Robb writes in high terms both of the conduct and of the progress of the pupils. The year under review was the first year in which the Hyderabad Medical School, opened in July 1881, submitted its pupils to the test of the final examination. The pupils consist of native medical pupils and High School pupils, and the object in view is to provide the province, isolated as it is from the rest of the Bombay Presidency, with qualified practitioners, as well as to recruit the local Subordinate Medical Service with suitable candidates. Eight High School pupils and eight native medical pupils passed the final examination. Surgeon-Major Keelan draws attention to the urgent need for increased accommodation for the school.

Bombay Industrial Schools.

40. Excluding the David Sassoon Reformatory, with its 215 inmates (who are partly convicts partly free students), the chief Industrial Schools in Bombay are those at Ratnagiri and Byculla, in regard to which the Director reports as follows:—

The School of Industry at Ratnagiri was established by the orders of Government, dated March 25th, 1879. In 1863 a school was started on a private basis, unconnected with Government, which developed into a Saw Mills Company, but failed in the share mania. The building, plant, etc., of the old Company was offered in 1879 for Rs. 25,000, and the Local Funds Committee purchased it. Thus originated the Industrial School, which is under the management of a Local Committee. It turns out annually a number of lads of the artizan and labouring classes, who are well instructed in useful mechanical arts, and whose woodwork has gained favourable notice at the exhibitions at Poona and elsewhere. The Educational Department has no concern with the management of the workshops, and is merely interested in the education of the lads. During the past year there were 92 boys in the school against 91 in the preceding year. The results of the examination showed very satisfactory exercises in drawing, but in other respects the Inspector remarks that "the boys have been pushed on rather faster than is good for sound progress."

The history of the Byculla institution further illustrates the difficulties attending the extension of Technical education. In 1879 the Council of Directors of the Education Society recommended an alteration in the course of instruction with a view to preparing boys for the mechanical trades. Certain boys on attaining the age of 16 were to be put to work in workshops and boarded in the Society's Apprentices' Home until they had qualified for suitable situations as mechanics. Government were asked for a grant of Rs. 20 a month for each boy above 10 in number and under 40, and the Society undertook to admit boys of good character from other schools when there was room for them in the Home. Government sanctioned these proposals in Government Resolution No. 918, dated July 24th, 1880. In December of the following year the Society, finding that the number of apprentices did not correspond with their expectations, asked for a modification of their original proposal. They applied for allowances for three-fourths of the boys in the Home instead of only for those in excess of the number, 10. Government in their Resolution No. 533, dated April 11th, 1882, fixed a grant of Rs. 10 a month for three years for three-fourths of the whole number of inmates of the Home. As the employers would not execute indentures, regular attendance at the workshops was made a condition of payment of the grant. Government also expressed their expectation that the Society would give suitable education out of work hours. The year under report was the closing year of the above arrangement. There were 24 youths in the Home, four of whom came from other schools. They were employed in the workshops of the Great Indian Peninsula Railway Company, the Docks, and the Port Trust Committee, and their progress is reported as satisfactory. The want of a drawing master is, however, represented by the Educational Inspector.

There are three other Industrial Schools in the Bombay Presidency, but they are small and of no marked educational importance at the present time. It is the hope of the Officiating Director of Public Instruction, Mr. Lee-Warner, that in course of time Municipal Boards will distribute a net-work of Industrial Schools over the presidency, and he advocates the concession of liberal grants-in-aid by Government in support of such institutions. These remarks indicate a line of policy which should not be lost sight of.

## Bengal.

1. For the higher professional training in Law and Medicine, Bengal is well equipped. The law possesses great attractions for the Bengali mind, and the law classes in the various colleges are well filled. The Calcutta Medical College is also a flourishing institution, in no need of special aid or encouragement from Government. The Engineering College at Seebpore, near Calcutta, has made progress; but it may be doubted whether it has yet established itself as a popular Educational Institution. It is at present isolated, with no Technical Schools of a preparatory sort leading up to. This is a defect not peculiar to Bengal, which it is understood to be His Excellency's wish to remedy.

Calcutta School of Art.

42. The first institution for Technical training of lower than collegiate rank to which attention is invited is the Calcutta School of Art, regarding which the following remarks occur in the last Bengal Education Report:—

The number of students on the roll continues to increase. There were 157 at the close of last year, against 139 in 1883-84, and 96 in 1882-83. The subjects taught continue to be the same, and the same standard of excellence is maintained. A very high standard in each stage has now been firmly established, and is well worked up to. It is the opinion of competent authorities that the students' work will stand well in comparison with that of any School of Art in England or elsewhere.

The lithographic class is still employed upon the plates for Dr. King's great work on the Indian order Ficaceæ, and the Committee for the Exhibition to be held in London next year have sought the assistance of the school for—

(1) a collection of work illustrating the various stages of instruction forming the school course;

(2) works in metal *repoussé*;

(3) wood-carving;

(4) designs for Monghyr slate works;

(5) designs for pottery.

The Principal anticipates that the school will acquit itself creditably in all these matters. He speaks in high terms of his staff of assistants, who are all natives and old students of the school, and particularly of Baboo Annada Prosad Bagchi, the head-master.

The receipts from fees were Rs. 3,406 against Rs. 2,803 in the previous year, and the expenditure was Rs. 22,642 against Rs. 18,109.

It may be noted here that the Government of India has recently recommended to the Secretary of State a proposal for strengthening the teaching staff of the Calcutta School of Art, and placing it under the control of a thoroughly competent Principal, to be engaged in England. It is understood to be the intention of the Bengal Government to strengthen and develop the demand for Art education by establishing, as time goes on, subsidiary schools in the chief cities and centres of the interior.

Medical Schools.

43. Besides the Medical School attached to Medical College, in which instruction is conveyed through the medium of the English language, there are four medical schools in Bengal,* in which

* At Sealdah, Dacca, Patna, and Cuttack.

instruction is being imparted in the vernacular. When the preliminary standard of education was raised for candidates for medical degrees and licenses in the Medical College, a more satisfactory guarantee of preliminary education was required also from candidates for admission into the vernacular schools. In consequence probably of this the number of students in the vernacular schools fell during 1877-78 from 862 in the previous year to 686. During 1879 the system of education of this class of medical subordinates was revised. Passed students of these vernacular schools were intended to be (*a*) Hospital Assistants and not independent practitioners until they had received additional instruction at some hospital for at least two additional years, when they might, if considered fit for it, be appointed to small places where the services of an Assistant Surgeon could not be afforded; and (*b*) village practitioners, who should in poor villages supplant baids, hakims, and kobirajes. The education these men were receiving became too theoretical for these purposes; and with a view to rectifying this, as well as other imperfections in the existing system of their education, it was decided (*a*) to limit the numbers taught; (*b*) to raise the standard of preliminary education; (*c*) to simplify the lectures, making them more tutorial; (*d*) to make the periodical examinations more frequent; and (*e*) to make the training more practical. These measures are said to have been attained by greater proficiency in the candidates who pass out of these schools. During 1882-83, owing to the abolition of the school at Nagpur, Central Provinces students were transferred to Bankipore. During 1883-84 the following numbers obtained diplomas at these schools :—

Campbell (Sealdah) Medical School, 37 out of 47 candidates.

Dacca Medical School, 33 out of 40 candidates.

Temple (Patna) Medical School, 23 out of 34 candidates.

Cuttack Medical School, 9 out of 9 candidates.

During 1882-83 a Homœopathic School independent of Government was started at Dacca, and 46 pupils attended it. In the following year 144 attended, and during 1884-1885 a second Homœopathic School was started.

Industrial Schools.

44. The Bengal Education Report for last year shows five Industrial and four Survey Schools attended by 172 and 171 students respectively. Only three of the Industrial Schools at present seem to subserve any useful educational purpose; and among these three the only school which is a really promising institution is the Industrial School at Mahisadul in the Midnapur District, which the public-spirited local zemindars have founded and endowed. This School is popular, having 68 students in the first year of its existence. Carpentry is the chief industry taught.

The Survey Schools at Dacca, Patna, and Cuttack are well spoken of; and the course of training, comprising as it does instruction in the rudiments of engineering, road and bridge building, etc., is declared to be as practical as can be desired at present. It is stated that, as a rule, passed students of these schools find little difficulty in obtaining employment.

On the whole, however, Industrial Schools in Bengal are at present mere excrescences on the educational system, formed on no plan, and having no well-defined object in view.

## PUNJAB.

Lahore Law School.

45. The latest information available regarding the Lahore School of Law is contained in the following passage from the Punjab Education Report for 1884-85 :—

> The Law School, which is maintained by the University, sends us no report. It appears from the statistics, which are now for the first time included in our returns, that it had on its rolls at the end of this year 71 students, and that the cost of maintenance was Rs. 4,572. The income derived from fees was Rs. 3,670; and this, added to the fees for Law examinations, I understand, do more than cover the whole University expenditure upon teaching and examining in law.
>
> The school passed 9 out of 37 candidates for the first, and 5 out of 24 for the final examination; these results being very markedly better than those obtained by private tuition, and than the corresponding results of last year. During this year the rules for the management of the school and constitution of the examinations in law have been revised. An Honour examination has been added, and the educational qualifications required for admission to the examination have been raised. At the same time the Chief Court has raised the standard of the University examinations required of candidates for admission to the local bar; and the result can hardly fail to be advantageous to the profession, though it may perhaps reduce the number of students in the Law School.

Lahore Medical School.

46. The Lahore Medical School consists of two departments—an Upper, in which the students are instructed through the medium of English during a course of five years, when they may obtain a diploma as Licentiate in Medicine and become eligible for employment under Government as Assistant Surgeons; and a Lower, in which students are taught in Urdu to the standard of Hospital Assistant requirements in a course of three years. The admission of women to the classes has been sanctioned, and last year—the first of the experiment—11 female students, 8 of whom only spoke the vernacular, were attending the school.

The preliminary standard of education for students entering the Upper Division is not so high as it is in the Medical College, Calcutta, the Entrance Examination standard being accepted. Up to 1879, 76 Assistant Surgeons had entered Government service from this school. Last year there were 77 students in this Upper Division.

The Lower Division or Vernacular class comprised—

(a) Those selected by Government to become Hospital Assistants, and who had passed a year previously in regimental hospitals;

(b) those educated by local funds to become native doctors at civil dispensaries; and

(c) hakims or their relatives.

In 1880 a new class was formed of civil medical pupils to be trained as Hospital Assistants for civil dispensaries, who were required to have a sufficient knowledge of English to be taught in that language. During 1883-84 there were 82 pupils in this Lower Division.

Dhai class.

There is also a midwife class, the pupils attached to which attend weekly lectures given by medical officers attached to the school. Their services are held in high estimation by the native population.

Measures have recently been sanctioned by the Secretary of State to increase the teaching power of this school; and it is to be hoped that degrees in Medicine will in course of time be conferred.

School of Art.

47. The Mayo School of Art at Lahore is intended to train craftsmen in the higher and more artistic branches of their crafts, more especially in the principles of design, and to exercise a general influence over the more artistic industries of the province by acting as an æsthetic centre, a school of design, and a source of enlightened criticism and advice.

The following is the curriculum pursued in the school:—

All students, without exception, are required to pass through the following Elementary course:—

(1) Blackboard Demonstrations of Freehand Drawing and outline from the flat.
(2) Elementary Geometry.
(3) Outline from the round.
(4) Rudiments of Perspective (Model Drawing).
(5) Light and Shade from the Round.
(6) Plant drawing from nature.
(7) Elementary studies of colour.

This course will be succeeded by more advanced and technical instruction suited to the aptitude and inclination of the students. The following are the chief subjects taught:—

(1) Architectural drawing and design suitable for mistries and draughtsmen.
(2) Advanced Perspective.
(3) Wood construction and ornamentation, as wood-carving, cabinet-work, etc.
(4) Modelling in clay and moulding in plaster; Architectural details for terracotta, stone-carving, etc.
(5) Modelling from Nature.
(6) Painting in oil, water-colour and distemper.
(7) Lithographic drawing.
(8) Engraving on wood and metal.
(9) Textile design, as carpets, embroideries, etc.

In all architectural and decorative work the principles of Oriental design are considered of the first importance.

The following extracts from the last report of Mr. Kipling, the Principal of the School, will serve to indicate the character of the teaching pursued in the school:—

The bulk of our students continues to be drawn from the artizan classes; and to many of them the two hours' daily instruction received by the junior classes in reading, writing and arithmetic from the school Maulvie is of great value.

Of the youths sent up by Municipalities and District Boards some are progressing favourably, but others have come up too young. In cases where such bodies employ draughtsmen, it might be worth their while to send them to the school for instruction in design, carpentry, etc.

The following Municipalities and District Funds provide stipends for the maintenance of youths sent by them for instruction: Amritsar Municipality, 2 students, Rs. 10 and Rs. 5 per mensem; Kasur, 2 at Rs. 5; Jhang, 1 at Rs. 5; Gujranwala District Fund, 1 at Rs. 5; Jullundur District Fund, 1 at Rs. 6; Gujrat District Fund, 1 at Rs. 6; Sialkot, 1 at Rs. 5; and the Nabha State, 2 at Rs. 11 each.

The most important work of the year and the most complete in point of accomplishment was the drawing done for the illustration of the Journal of Indian Art, including architecture, Mooltan pottery, ivory-carving and other subjects. Drawings were also made for carpets, screens in carved wood, for choice examples of Koft work, Hoshiarpur inlay and wood-work, most of the latter being given out for execution to artizans in the districts for exhibition at the Indo-Colonial display in London. The most important piece of original design was the billiard-room for His Royal Highness the Duke of Connaught at Bagshot Park. This was begun by Ram Singh and myself during the last vacation; and we succeeded in satisfying our patrons with a project for lining the new billiard-room with an elaborate arrangement of carved wood in the style of the last century of Punjab wood decoration. These designs and drawings, though chiefly the work of myself and Ram Singh, Assistant Master, were worked upon by the younger students, who

made full size experimental drawings, models, etc.—perhaps the most instructive practice that can be found. The actual work is too large and heavy to be undertaken in the school, and it is given out on contract to a carpenter at Amritsar who works under the direction of Ram Singh; while some of the choicer panels, etc., are reserved for the practice of the wood-carving class in the school. In addition to the lining of the billiard-room, all the furniture for the apartment was designed in the school so as to be in keeping with the rest. In a similar way the design for a carved screen, the gift of the Punjab Government to the Indian Institute at Oxford, was elaborated in the school on lines suggested by Mr. Basil Champneys, the Architect of the Institute, and actually carried out at Amritsar.

This school is capable of doing a great deal to rescue the art of Northern India from forgetfulness and corruption; but, like the similar schools in Bengal, it is now isolated, and owing to this isolation incapable of producing the full effect in the arts and industries of the province which under better arrangements might be produced. The number of students has risen from 33 in 1882 to 185 last year, and it is probable that the numbers would be even larger had the Principal's attention not been diverted to some extent from his proper duties by preparation for the Colonial Exhibitions: still much good is, in an indirect way, done by such preparations. "It cannot be denied," says Mr. Kipling, 'that the searching out and bringing forward of the great industrial and artistic capabilities of the province is of some use to the school, in that it brings us into contact with the best workmen, and gives that practical turn to our work which is so easily missed in theoretic teaching. The examples of Oriental design in the forms of engravings, photographs, books and our own drawings and casts that are gradually accumulating are of great use to artizans who come up from time to time to take instructions for special objects."

Industrial Schools.

48. There are four Industrial Schools attended by 93 students in the Punjab; but the schools seem worthless for any practical purpose, and the Director of Public Instruction is disposed to close them. He says they "have a tendency to degenerate either into charitable institutions or into factories supported by public funds. They do not introduce improved methods or special skill. The technical instruction they impart can be better obtained in local workshops, while the general instruction can be more effectively and more cheaply given in night schools."

This testimony is not very encouraging as to the immediate future of industrial training in the Punjab. But the complaint has been heard in other provinces also; and later on some remarks will be offered both as to the source of the difficulty and as to its remedy.

## North-Western Provinces and Oudh.

49. Under University Education, reference has already been made to the Law classes in the Benares, Muir and Canning Colleges, and to the Engineering College at Roorkee.

There is no School of Art in the United Provinces which is so full of artistic industries; and this is a defect which should assuredly be remedied.

Medical Schools.

There is no institution for imparting the higher education in Medicine; but the Agra Medical School instructs pupils up to the standard of Hospital Assistants.

Four classes of students attend this School:—

(*a*) Military students who have already passed one year in regimental hospitals.

(*b*) Civil students of the North-Western Provinces.

(*c*) Civil students for Rajputana.

(*d*) Private pupils.

The course of instruction extends over three years. The civil students (*b*) are admitted upon passing the Anglo-Vernacular examination or the modified Anglo-Vernacular examination. The former preliminary examination was found to be too severe a test; but those who enter through the modified preliminary examination upon passing out of the school obtain the lower rate of pay given to Hospital Assistants. The School is doing very good work, and appears to turn out a sufficient number of qualified men to meet the demand.

Forest School.

49*a*. The Imperial Forest School intended for the technical training of Executive Forest officers was established in 1878 as a provincial institution, though students from all provinces were admitted. The first theoretical course was held in 1881, when 30 students, arranged in two classes, attended lectures on forestry, botany, forest law, natural science, mathematics and surveying.

Since then the arrangements have been considerably improved, and the school has been converted into an Imperial establishment and placed under the Inspector General of Forests.

The Director of the Forest School is at the same time Conservator of the School Forests, and thus maintains a direct connection with the management of the forests in which the practical teaching is carried on.

The school was originally established for the professional training of Foresters and Forest Rangers for the Indian Forest Department. It is now, however, open to Forest candidates sent by Native States and to the public.

The school contains two classes—one for Rangers, taught in English; the other for Foresters, where Hindustani is the medium of instruction.

The Rangers' class is open to statutory natives of India, who have passed the Entrance Examination of the University or other similar test.

The students go through a course extending over 18 to 21 months, divided into two terms of purely theoretical teaching and two terms of instruction in the forests.

The first theoretical term comprises mathematics, morphological and physiological botany and other auxiliary sciences; the out-door term following comprises surveying and general instruction in the forest; the second theoretical term includes forestry in all its branches, including the protection of forests against injuries and diseases, systematic botany, forest law, geology and knowledge of soils, and the drawing and preparation of estimates for roads, slides and other forest works. During the last term valuation surveys and forest organization are taught in the forest.

The vernacular class is more elementary.

The Forest School grants certificates for Forest Rangers and for Foresters; also certificates of having passed in surveying by the lower and higher standard.

The school has proved useful, and has even during the short time of its existence turned out everal able Forest Officers.

During the last term the school was attended by 63 students, including 11 from Madras, 7 from Native States and 4 private pupils. Of these, 50 attended the Rangers' class and 10 that for Foresters.

Industrial and Survey Schools.

50. There are no survey and only two industrial schools in the Province. These schools, situated at Gorakhpur and Benares, are orphanages for Native Christian children under the charge of missionaries. It is gathered from the accounts given of them that they subserve no purpose of general technical training, even in their immediate neighbourhood.

On the whole, then, it may be said that there is room for improvement in all branches of technical training in the North-Western Provinces and Oudh.

## Burma.

51. Until 1883 there seems to have been in Burma no institution for training in Law, as there is still none for instruction in Medicine or Engineering. In that year, however, the Rangoon College was affiliated in Arts to the Calcutta University, and a chair of Law seems to have been established. The lectures, however, are as yet not recognized by the University; and as the school is only in its infancy, no further reference to it is here necessary. The following extract from the last Report of the Director of Public Instruction will show precisely the position of technical instruction in the province:—

> In addition to the apprentice school conducted in connection with the State Railway Workshop at Insein, I have to notice the opening of a special industrial branch of the Municipal High School at Akyab under Mr. J. Simeon, which has good promise of success.
>
> The Aided Mission Schools under Mr. Nichols at Bassein, Mr. Bunker at Toungoo, Mr. D'Cruz at Bassein, and Mr. Vinton at Rangoon have also for years made carpentry, printing, weaving, book-binding and other industrial arts part of their course of teaching; printing presses are attached to the Society for the Propagation of the Gospel and Roman Catholic School at Toungoo; and the Management of St. Paul's School at Rangoon proposes to inaugurate a system of Industrial teaching in their new buildings.
>
> These special schools are designed primarily for the training of Thugyis (or subordinate Revenue Officers), and the regulations under which they are conducted have been again revised in the past year. The revised rules are appended to this report.
>
> From these rules it will be seen that Survey schools are for the present to be conducted in five districts, and that they will be from time to time opened in such places and under such superintendence as the Chief Commissioner may direct.
>
> In the past year Survey schools have been maintained at Akyab, Rangoon, Bassein, Henzada and Pegu, the school at the last-named place being opened only in January last.
>
> The schools are under the general superintendence of District Officers, and no special reports on their working have been received excepting from Akyab.
>
> From the statistical returns forwarded by the Educational Syndicate and by the Survey teachers, it appears that a total of 41 students succeeded during the year in passing the provincial examination in surveying. Of these, 16 were pupils of the Henzada Survey school and 14 of the Hanthawaddy school.
>
> The Bassein school passed five, and the Akyab school nine. The Pegu school has not yet presented candidates.
>
> Of the great usefulness of these special schools, both in the interest of the public service and of the pupils of our schools, there can be no doubt.
>
> It will be fitting to notice here the working of the special measures adopted by the Government for preparing the youth of indigenous races for the profession of Medicine and of Engineering.
>
> As regards Medical instruction, the practical experiment made some years ago by the institution of classes at district head-quarters, conducted by Civil Surgeons, showed that it was still premature to inaugurate any local system of Medical teaching, and the plan was adopted in 1881 of selecting yearly a limited number of picked scholars to be sent for training to the Government Medical College at Calcutta.
>
> The allowances made to these scholars are very liberal, and an assured prospect of future employment in the province is held out to them.
>
> It was necessary, at the outset, to obtain from the Bengal Government special leave for the admission to the college of scholars not fully qualified by the regulations of the University; but the number of local candidates passing into the University having increased there is now no difficulty in selecting fully qualified scholars. At the present time seven scholars from the province are attending the Calcutta Medical College.

The general progress of the students is reported to have been good, though it is doubtful whether the scholars first appointed will be able fully to qualify for the grade of Assistant Surgeon.

The course of training occupies five years, and the ultimate success of the plan has yet to be seen. But there seems every reason to think that the plan is a sound one, and preferable to any hasty attempt to force Medical education in the province before the time.

A similar and subsidiary scheme of Medical education has now been adopted, whereby a fixed number of Burmese scholars are selected annually to be sent to Madras for training as Hospital Assistants.

Six such scholars are now at work in Madras, and the reports of their conduct and work are very encouraging.

Lastly, there has been correspondence in the past year on the subject of offering facilities for the Medical education of women in accordance with regulations lately introduced in the Calcutta Medical College. The subject, which is an important one, is still under consideration.

For the encouragement of the study of Engineering among the best educated youth of the province a system of scholarships, not less liberal than the Medical scholarships, and tenable at the Government Engineering College, Calcutta, has been in operation since 1881.

Four Engineering scholars are now attached to the Calcutta College, and will ultimately be attached to the Public Works Department in the province.

All the special scholarships here noticed are open exclusively to candidates of Burmese or Indo-Burmese origin, or of other races indigenous to the province.

From the preceding quotation it will appear that if it was not possible to record the existence of any considerable number of institutions specially designed for Industrial teaching still the recognition of the value of such teaching was extending, and a good deal of unpretentious good work in the direction of technical training was being done in the principal schools of Lower Burma. In May 1883 steps were taken by the Chief Commissioner to establish a Medical School at Rangoon; but it does not appear that the project has advanced beyond the stage of discussion.

## CENTRAL PROVINCES.

52. The returns from the Central Provinces show 19 Industrial schools attended by 361 students; but it is impossible to ascertain from the reports what these institutions are. An examination of the Education Report for last year conveys no satisfactory impression regarding the instruction imparted in these so-called Industrial Institutions.

The Administration of the Central Provinces relies more on the effect of scholarships and studentships tenable at such training establishments as the Poona Science or the Calcutta Engineering College than on the result of direct teaching; and it has accordingly promulgated the following rules to regulate these stipends :—

*No. 458, dated 6th February 1885.*—The following rules regulating technical studentships in the Central Provinces, having been approved of by the Chief Commissioner, are published for general information :—

(1) The Government of the Central Provinces has established thirty Technical studentships, of which twenty are for Natives, who must have attended at some school in the Central Provinces for two years before election, and ten are for Europeans or Eurasians who have attended a school in the Central Provinces for at least two years previous to election, or whose near relatives are domiciled in the Central Provinces.

(2) No boy will be elected to a Technical studentship after he has passed sixteen years of age.

(3) No Native will be elected to a Technical studentship who has not passed the Middle school examination.

(4) No European or Eurasian will be elected to a Technical studentship who has not passed by the 6th standard prescribed in the Code or Regulations for European schools in the Central Provinces.

(5) Subject to the above conditions, the studentships will be awarded to the best scholars, namely, to those Europeans and Eurasians who pass highest in the 6th or higher standard or who have matriculated, and to those Native scholars who pass highest in the Middle school or higher examination.

(6) The selected students will be medically examined by the Civil Surgeon of Nagpur, and if passed by him, will be on probation for the first three months; and at the end of that time they will be accepted as apprentices if their conduct and aptitude for the work are considered satisfactory. The time spent on probation will count towards their service as apprentices.

(7) The parent or guardian of each student accepted as an apprentice must sign an agreement in the form appended to these rules, binding the student as an apprentice to the Locomotive Superintendent of the Nagpur and Chhattisgarh State Railway or to the Assistant Manager, Wardha Coal State Railway, for 4 or 5 years, or to such other officer as the Chief Commissioner may from time to time direct.

(8) During the first two years of the apprenticeship, each apprentice shall receive a stipend, if a native of India of Rs. 5 per mensem, if a Eurasian of Rs. 10 per mensem,

if a European of Rs. 15 per mensem, subject to such deductions for irregularity in attendance, for great carelessness or other misconduct, as the officer to whom he is bound apprentice may direct.

In case of gross misconduct or inefficiency, the stipend may be withdrawn altogether by order of the Chief Commissioner.

(9) After two years the apprentice's stipend shall ordinarily cease, unless for special reason the Chief Commissioner allows it to be continued. The apprentice will then be paid by the department in which he serves according to his deserts.

(10) Parents or guardians wishing to obtain Technical studentships for their sons or wards, who may be declared eligible under rule (5), should make application in the form appended to these rules to the Locomotive Superintendent or Assistant Manager above mentioned.

(11) Each apprentice will be trained as a mechanic. Those who exhibit a talent for drawing will be trained as draftsmen, and will be eligible for appointments as foremen. Those who show no aptitude for drawing, or for the higher branches of practical mechanics, will, after serving for a short time as firemen, be eligible for drivers.

## Assam.

53. *Assam*, like the Central Provinces and Burma, possesses no institution for instruction in the higher courses of technical training; but it is shown as possessing one Industrial and 7 Survey schools The Industrial Institution (the Williamson Artizan School) does not seem to be successful, nor the prospects promising. With regard to the Survey school, the Inspector of Schools, Assam, writes :—

> These schools were all handed over to the Director of Agriculture on the 1st April 1885. Previous to that date I was able to visit three of them, and I considered the results very good as compared with anything we have ever attained to in surveying in Bengal.

## Hyderabad and Coorg.

54. In the statement presented in paragraph 12 of this note, neither Hyderabad nor Coorg are shown as possessing any schools for Industrial training. Still the following passages extracted from recent official documents indicate that something in these two Administrations in the way of technical training is being done.

*Coorg.*—The Chief Commissioner, reviewing the Report on Public Instruction, writes :—

> In the Central School at Mercara education appears to be in a preponderating degree of a classical and mathematical character. In the year under notice, the want of a master interfered for some months with the progress of the class for chemistry and physics. * * * In regard to technical education generally, and specially as concerns its application to the pursuits of Medicine, Engineering, Agriculture and artistic designs and fabrics, Mr. Girdlestone wishes to be informed whether anything more than the apparently limited course now pursued in the Central school is practicable and desirable, and whether technical education of an elementary character could with advantage be taught in the Primary schools.—(*Chief Commissioner's Resolution on the Coorg Public Instruction Report for 1884-85.*)

*Hyderabad.*—The Director of Public Instruction writes :...

> In the High schools all the classes, except the first, study the subject of drawing; and at the annual examination it appeared that five of the eight prizes were won by Amraoti and three by Akola. Three boys from the Amraoti school appeared for the 1st grade examination of the Bombay School of Art this year, and all of them passed in model drawing and practical geometry, and one in freehand drawing. The Head Master of the Akola High school says :—" Somehow or other the boys do not seem to take very kindly to this art, but improvement may be perceptible by-and-by." Out of 56 pupils examined in the subject in the Training College, 33 passed the test.

The Director promised in his report to submit proposals shortly on the subject of starting a good industrial school in Berar, as suggested by the Home Department.

## PART III.

55. The object of the preceding part of this note was to give a brief statement of the existing condition of technical education in the various provinces of the Empire. An endeavour will now be made to set forth as concisely as the nature of the subject will permit the steps taken by each Government to give effect to the orders of the Government of India * enforcing the necessity of improvement in the matter of Practical and Industrial training.

* Conveyed in Home Department letter, dated 23rd October 1884.

56. It will clear the ground if it be at once said that nowhere, except in Madras, have any practical steps been actually taken to give effect to the orders in question.

From Bombay the information received is more satisfactory for the promise of improvement which it gives than for the results already achieved. The inclination of the Bombay Government seems to be in favour of an extended system of technical teaching as advocated by the Government of India; but no practical steps, like those to be noticed in the case of Madras, have been yet taken to give effect to this policy. In a recent letter, however, it is stated that His Excellency the Governor in Council has under consideration important measures " for the extension of higher education combined with a wider range of instruction, and for the introduction of practical subjects into the primary standards."

57. From Bengal nothing has been heard, except a general expression of concurrence in the policy laid down. But it is understood that the Lieutenant-Governor is most anxious to give effect to that policy, and that he has before him the outlines of a scheme by which effect may be given to it.

58. From the North-Western Provinces, the Punjab, Assam and Hyderabad we have received no notice of practical measures being in contemplation in the direction advocated by the Government of India. From Coorg also no information has come, though it may be inferred from the passage cited in page 20 of this note that the subject is engaging attention.

59. From the Central Provinces no active measures are, it seems, to be expected, if one may judge from the following passage (in which the Chief Commissioner concurs) from a recent Report by the Director of Public Instruction.

I am inclined to think that the whole system as prescribed for Madras is much in advance of the state of native society in that Presidency. But still it is as well perhaps to have a large scheme to work up to. For ourselves, I think that for science teaching, for technical training, and for instruction in Art, we must depend on our colleges in affiliation with the Calcutta and Bombay Universities; on our scholarships tenable at science colleges and at Engineering schools; on Industrial scholarships tenable at the State Railway Workshops and at the Warora Colliery Workshops; on scholarships tenable at the school of Art, Bombay; on the system of apprenticeships in the Public Works Department; and on the appointments and training offered by the Forest Department. It will be necessary, I am afraid, to increase the value of Industrial scholarships. But any proposal on this matter will form the subject of a separate communication, when we have had some experience of the working of our Industrial scholarship system. In the meantime, I can only suggest that we proceed steadily in accordance with our present system, and I may point out that whilst Madras has one town of more than 10,000 inhabitants, 8 of more than 50,000 inhabitants, 21 of over 20,000, 44 of over 10,000, and 116 of more than 5,000 inhabitants, the Central Provinces have only 3 of more than 50,000, 3 of more than 20,000, 10 of more than 10,000, and 36 of more than 5,000 inhabitants. Technical and Industrial training would naturally be more sought after by an urban than by a rural population. Madras in the large towns has a large class with whom mental culture is hereditary. In the Central Provinces any such class we may possess are foreigners and infinitely few.

60. From Burma the information is more satisfactory, as the following passages extracted from the proceedings of the Burma Administration for March 1886 will show:—

(a) "It is impossible not to recognize in the new departure taken by the Madras Government a hopeful promise for the supply of the most crying want of the system of Indian education as well as an example which may be followed in this province, if only at a respectful distance, with the greatest advantage to all sections of the population, and I feel sure that the cordial concurrence of the Chief Commissioner will be given to any adaptation of the scheme, or to any plan aiming at a similar object which may be found suitable to the circumstances of the province.

Extract from a letter, dated 27th November 1885, from Director of Public Instruction, Lower Burma.

In this letter I can do no more than indicate in bare outline the direction which my proposals would take.'

The Madras scheme is summarized by its author as a system of public examinations supplemented by liberal grants-in-aid, and the plan which I should propose would fall within the same definition.

A system of public examinations for certificates and rewards may be usefully grafted on to our existing system of provincial examinations; a system of special grants-in-aid will serve to stimulate the study of science, and of practical arts and industries in existing schools; and both together will combine to lead the youth of the province to value more highly than at present the utility of many occupations in life which are at present slighted or left out of sight rather through ignorance than from any other cause.

My scheme would at the outset involve a modification of the existing provincial standards of instruction for Primary and Secondary Schools.

Beginning with the Elementary Vernacular School, it would aim at the encouragement of object lessons and of drawing; and in Secondary Schools the prescribed curriculum would be so modified as to give pupils the option of following a literary or a practical course.

The importance of Technical Instruction being thus practically recognized, secondary Schools throughout the province would be encouraged, by the offer of special aid in various forms, to open something akin to which is called the 'modern side' of English public schools, in which a prescribed standard of instruction in general subjects having been attained, the pupil's energies would be devoted to some branch of special instruction. To each of the Government Normal Schools a special class would be attached for the training of teachers for Industrial Schools.

The science classes of the Rangoon College might at the same time be largely developed.

Finally, for the special encouragement of Technical instruction, a series of special scholarships would be proposed tenable in any recognized Industrial school, or Industrial department of a school.

The public examinations for certificates and prizes of the students trained under this system would be open only to those who had passed a standard of general instruction equivalent to the Middle School standard."

(*b*) "In the view of the Syndicate one of the most pressing needs of the province, in the direction of Technical education, is the establishment of a Medical School. They think that too much must not at first be attempted. A shortened course teaching in the vernacular instruction in the simpler operations of surgery, and in obstetrics would do much. They are aware of the difficulties which beset this project, the chief of which are the want of text-books in the vernacular and of the instructors qualified to teach in Burmese. The Syndicate are willing, if desired by the Chief Commissioner, to undertake to procure professional advice in the selection of text-books and will endeavour to arrange for their translation. It is to be hoped that amongst the students now maintained in the Calcutta Medical College by Government some suitable teachers may be hereafter found. The Syndicate are disposed to think that a commencement might now be made in the selection and translation of text-books. They hope that when the local Medical school is set on foot, the importance of the classes of Native females to partake in Medical instruction will not be overlooked.

From the Registrar, Educational Syndicate, Burma, to the Secretary to the Chief Commissioner, dated the 12th February 1886.

They have reason to think that the workshops at Insein are doing excellent service in the cause of Technical education. They have the satisfaction of observing that arrangements were made in 1884 for an increase in the number of studentships at that institution. They are inclined to think that a diploma from the Syndicate might be of service to intelligent and industrious students who have served their time in that institution, and if the Chief Commissioner desires it, the Syndicate would undertake to conduct an annual examination in mechanical engineering.

The question is still under consideration at Rangoon."

61. It has been stated the Government of Madras alone of Provincial Governments has already taken action, in accordance with the orders of October 1884, with a view to establish or extend a system of Technical and Industrial training. The aim and scope of the Madras scheme is to be found in the following passage in the report which Mr. Grigg, the Director of Public Instruction, submitted last year to his Government. The passage is long, but the interest attaching to it justifies its quotation :—

In England the system found to be most successful in extending and improving Technical education in Science and Art has virtually been to begin with a system of general examinations, thus creating a demand for trained teaching, and then to train teachers to meet that demand. This system leads to a continually-increasing number of new schools, and to instruction continually improved as teachers are forthcoming, abreast with the most recent progress made in Science and Arts as applied to the industries. Though in the matter of Technical education England has been generally supposed to be considerably behind its continental neighbours, and though, to a certain extent, this is true as regards France, Germany and Switzerland (and even Italy too, which, while ranking after the first-named countries, possesses nevertheless a well-organized system of Technical instruction), yet there is no doubt whatever that England, under the present system, is rapidly making up for lost time, and is in some respects beginning to afford a model for continental countries. The Royal Commission (on Technical instruction) in its last report expressly states that "for the Technical education of workmen outside of the workshops the resources of continental countries have hitherto been and are still very much more limited than has hitherto been supposed to be the case," and that "no organization like that of the Science and Art Department or of the City and Guild of London Institute exists in any continental country, and the absence of such organization has been lamented by many competent persons with whom the Commission came in contact abroad."

The lesson to be drawn from the above would seem therefore to be that, in starting in this presidency an organization for the development of a system of improved Technical education, it will be well, profiting by the experience of our predecessors in a similar path at home and abroad, *to try the stimulating effect of a scheme of examinations, supplemented by a system of liberal grants-in-aid, making at the same time provision for the supply so urgently needed, of well-instructed and professionally trained teachers. And, in addition to this, steps will need to be taken to develop the Scientific and Art institutions now existing at the presidency so as to make them not only teach all or most of the sciences and art of which need is at present felt, but also serve both for the provision of a supply of Science and Art teachers and as models for private effort.*

The italics are not in the original. Special attention is invited to this passage, as it seems to be, as far as it goes, thoroughly sound and good advice.

*Public examinations.*—Looking first at the effect of public examinations, it is matter of notoriety that in this country, still more than at home, *to institute public examinations i any suitable branches of knowledge is to create a demand for instruction in them.* Th University examinations have called forth, in numbers far beyond all anticipation at the time they were instituted, both candidates and teachers, and Middle School examination has been even more successful in that way. * * It must not be forgotten that the possession of certain knowledge (provided the knowledge is sound and practical) has a direct tendency to make the possessor seek the means of applying his knowledge to the conditions in which he is placed, and thus gradually there is created a demand for specialists. And, further, the existence of readily accessible schemes of instruction in branches of knowledge mapped out in suitable syllabuses or indicated by reference to particular text-books, leads men engaged in Scientific or Industrial pursuits to seek to acquire additional knowledge in cognate subjects, and such additiona

knowledge the exigencies of their lines render valuable, although the men may never actually appear for a test examination in it. *Thus the effects of public examinations are for more wide reaching than the number of candidates who pass examinations would indicate.*

This is quite true.

But, besides these general reasons, there is the more cogent and acknowledged necessity that, for students of subjects not falling within the scope of the University, there should be provided public examinations conducted by examiners of unquestioned special knowledge in the branches concerned, but entirely independent of the institutions presenting the candidates. Even now the Agricultural College, the School of Arts, and two or three Industrial Schools require such a scheme of examinations if they are to work with full success, and if they are to secure a full measure of public confidence, and ensure the certificates they grant being duly appreciated.

This seems a weak point in the Madras scheme. The University should, it is submitted, be the examining body.

It is desirable that at first a considerable number of those who pass the examinations should find employment as teachers, and to encourage this certificate grants will be given to those who have a sufficient number of pupils *bonâ fide* under their instruction in special schools or classes, while result grants will be given on their pupils passing the tests fixed in this and in the Middle school Notification. And, in addition to the ordinary building and rent grants, grants will be given in aid of the building and fitting of laboratories and demonstration-workshops, and the purchase or rent of demonstration-farms. Grants will also be given in aid of museums, partly (it is proposed) in the way of building grants or rent grants, and of money grants for the purchase of models, etc.—partly in kind from the spare collections of the Madras Museum.

Science, Art and Industrial scholarships are also provided for, and it is hoped that by these pupils who have shown a bent for Science, Art, or Industries and a certain amount of capacity therein, but who are not able to join special institutions, may be enabled to prosecute their studies further at the Science, Art, or Industrial classes in connection with ordinary colleges. In order to diffuse, as widely as possible, the special instruction contemplated, such classes will be permitted to be either day-classes or evening-classes and to admit outsiders as well as the students pursuing their ordinary studies at the college to which the class is attached . . . . . The Science, Art and Industrial classes and schools will offer a sound Technical education to youths from Secondary schools who are willing to enter Industrial careers, and these classes may also in time be availed of by the more intelligent artizans who have received some education at ordinary schools. Such are at present few, but their number is increasing. Industrial schools are at present few in number ; but the proposed scheme will, if adopted, give a stimulus to the establishment of such, and from them a considerable number of candidates may in time be expected to come up for Industrial scholarships that will enable them to carry their Technical studies further than otherwise would be the case. Even already the publication of the last Middle School Notification has had a stimulating effect in this direction, and in a few schools, hitherto entirely of the ordinary type, the constitution of Industrial classes is contemplated, while previously-existing Industrial schools and classes are, I understand, being recognized on a more systematic footing, so as to work on the lines laid down by Government.

*Government Schools and the Training of Teachers.*—To give a fair start, however, to Technical education, it is essential that Government should take the lead in such education as was originally done in England by the establishment of the Government School of Design and the Government School of Mines, and as is at present the case in the vastly-improved institutions that have sprung from these and that now exist at South Kensington as the Departmental Normal Schools of Art and of Science, respectively. Even in England, the great Technological Training College of the City and Guild of London Institute did not spring into existence till Government had set the example, and in this country, where there are no corporations with vast funds at their disposal; where private enterprise seldom leads, and where the conditions are in so many respects different, it is still more essential that Government should show the way. Just as in the matter of ordinary education, Government colleges and schools have been found necessary to create a demand for sound education and to serve as incentments and models for the establishment of private institutions, and to create a supply of teachers, so it will have to be as regards Scientific and Technical instruction. One institution for Science as applied to the industries connected with agriculture, another for Industrial Art, and a third for the profession of Engineering and for the allied subjects, would suffice at first as far as Madras goes, and these can be developed out of the existing institutions—the Agricultural College, the School of Arts and the Civil Engineering College. It will be necessary to strengthen the Madras institutions which give instruction in Science, Art, or Industries, because, for some time to come, it will be principally to them that the mofussil and the outlying States will look for a supply of competent teachers. Probably, as in England, local schoolmasters who have a taste for Science or Art, especially those who have graduated in Physical or Natural Science, will, if attracted by sufficiently liberal offers, be willing to come to the capital to receive instruction and training. Others again, not schoolmasters, who have availed themselves of their advantages to qualify as teachers of Science or Art, will seek employment in that capacity, and in this way the means of instruction will in time be made available in all centres of any importance.

In all the examinations that will admit of it, there will be a practical side, and upon this feature great stress should be laid. Half the maximum marks will be assigned to this practical side, and out of that every candidate will have, in order to pass, to obtain at

least one-third. This is necessary, because what it is desired to promote is, not knowledge acting on material progress merely indirectly, but knowledge which directly bears upon Industrial development. To quote from a recent speech of His Royal Highness the Prince of Wales: "Hitherto all schools have led up to the Universities, and Literary training has been encouraged to the disadvantage of Scientific instruction. Manufacturing industry has consequently not been able to attract to its pursuits its fair proportion of the best talent of the country." Not only is this still more decidedly the case in this country, but even such Science teaching as has been encouraged has been mostly theoretical, and certainly has had no direct reference to Industrial pursuits. A Science B.A. of the Madras University does not learn enough practical Science to earn his living in any Industrial pursuit in which the practical application of some branch of Science is requisite. That those competent to do good practical work will find employment there can be little doubt. Even the students of the Agricultural College and of the School of Art, in spite of the poor general attainments of the majority of them, have hitherto done so; and with an improved and more practical curriculum and a searching experimental and literary examination, they are still more likely to do so. In the syllabus of Agriculture it is provided that the full diploma shall not be granted until the student has in all (including his college course) devoted five years to his profession. Similar conditions are attached to one or two other branches. Good veterinarians will find their services in good demand, and so will good builders. Even for foresters there is a demand outside the service of this Government or of the Government of India, as Native States and large zemindars are becoming alive as to the necessity of employing them. Trained machinists have hitherto had to be brought out from England. A local supply would meet a demand slowly but surely tending to increase.

*Agencies.*—In each Government college, when pupils can be got in sufficient numbers to form a class, Science teachers and Drawing masters will, as soon as practicable, be appointed, and some of the existing ordinary teachers will, should the Government approve the proposal, be offered inducements to qualify in special branches, receiving grants as an addition to the salary for extra work done by them as Science or Art teachers. In most large towns there are a number of young men of some education, who will, I hope, be ready to join such special classes if the fees at first are fixed at a very low rate, and this is the very class which it is so essential to direct to Industrial occupations. It has been suggested by the Principal of the Rajahmundry Government College that a carpentry class might be worked in connection with colleges. The experiment might be tried in the Rajahmundry College if a qualified instructor can be procured. In Government colleges the teachers of Science, Art, or Industry should be paid partly by fixed salaries (or, in the case of teachers employed in ordinary teaching also, by fixed additions to their other salary), and partly by payments on the results of the annual examinations. In Aided Colleges it is proposed that aid be given partly on the results as above, and partly by half salary grants to certificated teachers. In the beginning the certificate need not too rigidly be insisted on, provided the department deems the qualifications sufficient for the special work to be done, and the teacher agrees to study for the method and teaching power certificate. When a museum or art collection is opened and approved of by the department, the teacher should be the curator, receiving a small extra stipend or grant, the hope of which will encourage him to push on that part of the scheme.

62. With the proposals thus made by their Director of Public Instruction, the Madras Government dealt in two ways. The Government of India had recommended a bifurcation of studies into (*a*) literary, (*b*) practical courses in High Schools. The Madras Government very wisely, it is submitted, resolved to establish the bifurcation in the Middle School, that is, a stage sooner than had been proposed by the Government of India; and it therefore took advantage of the Director's report to remodel the Middle School examination. The scheme of this examination as it now stands remodelled is reproduced on the margin. It will be found to contain a variety of Commercial, Technical, Scientific, and Industrial subjects; and if only the teaching staff of these schools becomes in course of time adequate to the subjects to be taught, pupils desirous of qualifying for Commercial and non-literary pursuits in after-life may at this stage acquire a knowledge of the rudiments of the special branches of study or handicraft they choose to enter upon.

The scheme of examination shall comprise the following branches:—

A. First (or compulsory) language.
B. Second (or optional) language.
C. Geography, Map drawing, and Indian History.
D. Arithmetic.
E. Mathematics.
F. English History.
G. Introductory Science, with one of the following:—
- (1) Physical Geography.
- (2) Geology.
- (3) Astronomy.
- (4) Animal Physiology.
- (5) Botany.
- (6) Agriculture.
- (7) Electricity and Magnetism.

Or one of such other branches of science as may hereafter be added to the above list.

H. Music.
J. (For females only) Domestic Economy.
K. Drawing.
L. Modelling.
M. Wood-engraving.

For males only. { N. Carpentry, joining, turning, and cabinet-making.
O. Ironsmith's work. }

P. (1) Jeweller's work.
(2) Silversmith's work.
Q. Printing.
R. Tailoring.
S. Boot and shoe-making.

For females only. { T. Needlework: either—
- (1) Industrial special branches, either—
  - (i. Dress-making; or
  - (ii) Boot and shoe-making (in part); or
  - (iii) Native tailoring; or
- (2) (*a*) Plain needlework.
  (*b*) Fancy needlework. }

U. Telegraphy.
V. (1) Mercantile Arithmetic.
- (2) Advanced spelling and superior penmanship.
- (3) Book keeping.
- (4) Commercial correspondence.
- (5) Commercial geography.
- (6) Short-hand writing.
- (7) Political Economy.
- (8) Fire, Life and Marine Insurance.

Such other branches of knowledge as may hereafter be added to the above list.

63. But the Madras Government was not satisfied with thus remodelling the Middle School examination with a view to making it subserve the purposes of a more practical training. It

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determined, in accordance with Mr. Grigg's recommendations, to go further and establish an entire system of advanced examinations in Sciences, Arts, and Industries, and, in pursuance of this object, appointed a strong Committee to consider the whole subject with reference to Mr. Grigg's report and the orders of the Government of India. The Committee had instructions to fix the details and the exact character of the syllabuses necessary to carry the policy of the Government into effect. The result was a report, following which the Government of Madras on the 22nd April last published a notification launching the new scheme of Technical and Industrial Examination in that Presidency. The important portions of this notification are here quoted :—

*Higher Examination in Science, Art, and Industries.*

With a view to give effect to the instructions of the Government of India, as contained in their Resolution, $\frac{10}{30}$, of the 23rd October 1884, HIGHER EXAMINATIONS in various branches of TECHNICAL SCIENCE and ART and in INDUSTRIES will be held at such times and places as may hereafter be determined, and of which due notice will be given.

2. THE OBJECT of Government in instituting these examinations is to encourage advanced instruction in Science and Art, especially in those kinds of knowledge which bear upon the different branches of industry now existing in this Presidency or suitable for it and to furnish a means of testing wholly, or in part, the qualifications of persons desirous of becoming—

I.—(a) Science, (b) Art, or (c) Technical } Teachers; or

II.—Mechanical engineers; mechanical draughtsmen: electrical engineers; telegraphists; builders; designers; engravers; decorative or art workmen in any branch of artistic industry included in this notification; or

III.—Scientific agriculturists; foresters; veterinarians; or

IV.—Managers or foremen of manufacturing, printing, and other Industrial establishments suitable for this Presidency; or

V.—Employés in posts in the Revenue, Revenue Survey, Public Works, Education, Agriculture, Forest, Sanitation, Cattle Disease, Vaccination, or other Departments which require a practical knowledge of any of the branches of Science, Art or Industry in which it is proposed to examine, and for employment in which Government may, from time to time, see fit to recognize these examinations as a test; or

VI.—Employés in similar posts under District Boards and Municipal Councils, or under private employers.

3. THE KIND OF SCIENTIFIC INSTRUCTION that it is proposed to test differs from that given in connection with the University examinations in this, that what is contemplated is not so much Abstract Science or Science studied merely for the extension of knowledge and the enlargement of the mind, but Science viewed in its application in various manufactures and industries. Similar remarks apply to the Art examinations.

* * * * * *

8. THOSE WHO PASS the examinations will receive SINGLE SUBJECT CERTIFICATES, GROUP CERTIFICATES, OR DIPLOMAS, and to some there will, under certain conditions, be given also PRIZES and REWARDS and SCHOLARSHIPS.

THE TEACHERS of passed candidates will be eligible for GRANTS under the Grant-in-Aid Code (see Grant-in-Aid Code).

9. In connection with these examinations, SCIENCE TEACHERS, LECTURERS AND DEMONSTRATORS will, as opportunity serves and funds allow, be provided in every Government College, which will be provided also with COLLECTIONS OF APPARATUS AND SPECIMENS and with LABORATORIES. Encouragement will be given to all recognized Colleges and High Schools to make similar provision, and to District Boards and Municipalities to establish DEMONSTRATION-WORKSHOPS AND FARMS in connection with the above teacherships and lectureships, so that theoretical instruction may be supplemented by practice.

* * * * * * *

12. The separate SUBJECTS in which examinations will be held are, for the present, those in the following list, which, however, may be added to. Notice of any addition will be published in the *Fort St. George Gazette* :—

NOTE 1.—Till further notice, no examinations will be held in those subjects whose names in the list are enclosed in square brackets [ ].

NOTE 2.—Advanced examinations will, for the present, be held in those subjects only whose names in the list are printed in CAPITALS.

NOTE 3.—For each subject, except those whose names in the list are enclosed in square brackets, there is published a syllabus of the knowledge required for the examinations, and such syllabuses are on sale at the Madras School Book Society's Depôt, Old College, Nungumbakam, Madras.

Subject :—

1. PURE MATHEMATICS.
2. PRACTICAL PLANE AND SOLID GEOMETRY.
3. Mensuration.
4. STATICS, KINETICS, HYDROSTATICS, HYDROKINETICS, AND PNEUMATICS.

5. Applied Mechanics.
6. Hydraulics and Hydraulic Engineering.
7. Building Materials and Construction.
8. Plan-Drawing from Specification and Estimate-making.
9. Surveying, Levelling, and Setting out.
10. Earth-work, Road-work, and Railway-work.
11. Bridge-making.
12. Machine Construction.
13. Mechanical Drawing.
14. Steam and the Steam Engine.
15. Heat.
16. Light.
17. [Sound.]
18. Metallurgy.
19. Electricity and Magnetism.
20. Practical Telegraphy.
21. Electrical Engineering and Instrument-making.
22. Electro-Metallurgy.
23. Inorganic Chemistry.
24. Organic Chemistry.
25. Geology.
26. Mineralogy.
27. Physiography.
28. [Principles of Mining.]
29. Agriculture.
30. Animal Physiology.
31. General Biology.
32. Veterinary Surgery and Medicine.
33. Botany.
34. Forestry.
35. Economic Entomology.
36. Hygiene.
37. Drawing, Painting and Design.
38. Modelling.
39. Wood and Copperplate Engraving and Etching.
40. Photography.
41. Printing.
42 & 43. Carpentry, Joinery, Cabinet-making, and Turning.*
44. Carriage Building.*
45. Boot and Shoe-making.
46. Tanning Leather.
47. Silversmith's Work.*
48. Jeweller's Work.
49. Watch Repairing and Clock Repairing.
50. Pattern Designing.*
51. Textile Fabrics, A.—Cotton, B.—Silk.
52. Cotton Spinning.
53. A.—Bleaching, Dyeing, and Printing Cotton. B.—Silk Dyeing.*
54. Carpet Weaving.*
55. Pottery and Porcelain Manufacture.*
56. Glass-making.
57. Paper-making.
58. Philosophical Instrument-making.*
59. Tobacco Manufacture.
60. Tailoring.
61. Dress-making.
62. Lace-making.
63. Bread-making.
64. Cookery.

65. [Tuning and Repairing Musical Instruments.]

66. Music.

* * * * * * *

18. In each subject PRIZES will be given if, in the opinion of the examiners, any candidate shall possess sufficient merit.

To the candidate who, in the Preliminary Examination, passes highest in the Presidency, and is not more than 22 years of age at the date of examination, there shall be given a medal or prize, the nature and value of which will be determined hereafter.

To the candidate who passes highest in the Advanced Examination, and is not more than 25 years of age at the date of the examination, there shall also be given a medal or prize, the nature and value of which will be determined hereafter.

[IN MATHEMATICS prizes will be given only in the Advanced Higher Examination.]

19. If, in the opinion of the examiners, candidates show sufficient merit in any subject, to the first three of those candidates who stand at the head of the list of those who pass in that subject at the Preliminary Examination in any year, SCHOLARSHIPS of R12, 10, 8 respectively per mensem for the next two years will be given, provided they have passed in a subject in which there is an Advanced Examination, and continue to study it in a recognized Science, Art, or Industrial school or class. In each of the subjects in which the Preliminary Examination is divided into stages, and in each of the subjects in which there is only one examination, but that divided into stages, scholarships of half the above amounts, but tenable for one year only, may be given to the three candidates who stand at the head of the list of those who pass in the first stage: provided that in their examination they, in the opinion of the examiners, show sufficient merit, and that they continue to study the subject in a recognized Science, Art, or Industrial school or class.

No candidate shall be allowed a scholarship in Science who has not either at the Preliminary Examination itself, or at some examination accepted by the Commissioner as equivalent, passed the first stage of pure mathematics and of drawing respectively, and in one at least of the Science subjects of the Middle School Examination.

NOTE.—The object of this restriction is that the student, before commencing an advanced Science course, should have acquired such familiarity with the rudiments of mathematics and with practical draughtsmanship as shall enable him to enter with advantage on higher scientific studies.

No student shall be allowed to hold at the same time more than two scholarships. If eligible for more than two at the same time, he shall elect which two he will hold, the scholarship or scholarships rejected passing to the next in order, if, in the opinion of the examiners, he shows sufficient merit.

20 Candidates who pass first or second class in the full Preliminary Examination in more than one subject, and who, in the opinion of the examiners, show sufficient merit, shall, for each additional subject in which they pass, receive REWARDS of R12 or R6 according as they pass in the first or second class.

* * * * * * *

64. Such then is the scheme of Technical education, which, in compliance with the wishes of the Government of India, Mr. Grant Duff has organized in his Presidency. As a whole, the scheme is a remarkable one. It gives increased prominence to the Commercial, Industrial, and Technical side of education as opposed to Literary studies; while an excellent point is made by making the bifurcation of studies begin a grade lower down the scale of schools than the Government of India, following the Education Commission's Report, had ventured to suggest. Of course it will be necessary to establish the bifurcation in High Schools too; for High School students are not always recruited from those who have passed through a Middle School.

But if the Madras scheme has thus its recommendations, it has also its defects. It is not so much concerned with teaching as with testing the results of teaching, and it omits to suggest such a practicable modification of the existing scheme of lower general education as would include in the curriculum the studies and arts proficiency in which it proposes to test. But these defects are defects of omission; they must have been before the mind of the Madras Government, for they naturally arise from a comparison of Mr. Grigg's proposals with the published scheme; and as money and teachers become available, no doubt they will be corrected.* If, however, any scheme for the whole Empire is to be prescribed, these points must not be neglected.

* Article 9 clearly foreshadows the establishment of classes in Government Colleges and High Schools when funds become available.

## PART IV.

65. The preceding statement of the condition of technical education in each province of the Empire, and the measures in progress to improve it has run on to a greater length than had been intended. It seemed, however, better to err on the side of prolixity rather than on the side of conciseness in describing the existing state of things. For it is only by a clear perception of the strong points and the weak points of the present system that we can safely introduce changes or improvements.

66. Generally, it may be said regarding our system of technical instruction that there is much room for improvement. To begin with University education and with the Faculty of Law, it would seem that only in Bengal are the facilities for study all that can be at present desired. In both the Madras and the Bombay Presidencies sufficient facilities are not afforded for the study of

the Law. In only one out of eight first grade colleges in Madras, and in only one out of six in Bombay, have Law classes been established; while since the foundation of the Madras and Bombay Universities, * only 238 degrees in Law have been conferred by the former, and only 132 degrees by the latter. The case is far different in Bengal where Law is taught, and well taught in eight colleges, and where 1,328 degrees in Law have already been conferred by the University. Even in the North-Western Provinces, three out of the total number of five colleges have Law Schools attached.

* By Acts XXVII of 1857 and XXII of 1857, respectively.

67. There is a wide career of usefulness open all over the settled districts of India for trained lawyers. The Bench absorbs a large number, with the result that the administration of justice is greatly improved. And besides this improvement, there is another gain in the better tone and *morale* of the native civil judiciary, consequent on the criticisms to which they are exposed at the hands of an instructed and independent Bar. It seems therefore that the establishment of Law classes in some or all of their first grade colleges is one point to which as opportunity offers the attention of the Governments of Madras and Bombay might with advantage be directed. On this head the other Presidencies or Administrations do not seem to stand at present in need of suggestions from the Government of India.

68. In regard to University education in Medicine, the organizations in the three Presidency towns seem to be all that the circumstances of the time demand. It may be admitted that *degrees* in Medicine should only be awarded when a high standard of professional education has been attained; and this seems only possible in cities where the services of an adequate teaching staff can be secured, and where the existence of large hospitals affords satisfactory opportunities for clinical and pathological instruction. The number of degrees in Medicine conferred by the Calcutta University (567) is very satisfactory; and the Bombay number (172) is encouraging. The Madras University Medical graduates are indeed few; and if we were not assured that the paucity in their numbers (which all told amount to only 45) is due to some extent to the preference of students of the Madras Medical College for British degrees, one might be disposed to suspect inefficiency in the teaching, or excessive strictness in the examination tests.

69. In the Lahore Medical College recent improvements and additions to the teaching staff have brought the Medical School abreast of the requirements of the time and province, and no further suggestions seem to be called for here in regard to it. The Medical School at Agra, on the other hand, does not rank as a college. It is a school of third rate rank, both as regards teaching power and the character of the diplomas conferred. Having regard to the fact that Agra is the only centre of Medical education for a large and densely peopled tract of British and feudatory territory, it is worth considering whether its teaching power should not as funds admit be strengthened, and whether the school should not be raised to the same footing as the College at Lahore.

A review of medical teaching in India at the present time would be incomplete without some allusion to the great impetus which is being given to the medical training of women, by the organizations connected with Her Excellency the Countess of Dufferin's Fund. On this occasion, however, no more than a passing reference is required.

70. The facilities afforded for University training in Engineering appear, as far as mere teaching goes, to be as extensive and complete as the circumstances of the time require. The colleges at Calcutta, Madras, Poona, and Roorkee are well-equipped, and the *theory* of Engineering is as well taught as perhaps in England. The defects seem to lie in the too theoretical nature of the teaching, in the complete isolation of these colleges, and in the want of facilities for practical instruction at Madras and Roorkee. The first mentioned defect seems almost inseparable from any system we can devise: but it can be greatly minimized. The workshops at Seebpur and Poona do much towards making the instruction in these colleges of a practical character: and it is suggested that an effort be made towards turning to similar use the important workshop belonging to the Local Government near Roorkee, and towards establishing a connexion with the Railway workshops in Madras. A year's work in these shops would form a very useful adjunct to the existing college course. The second defect is due to the entire want of Elementary and Secondary Schools of a technical character leading up to the college courses. At present the college is the *alpha* and *omega* of instruction in Engineering. This is a defect which equally exists in connexion with Schools of Art.

71. So much for the general condition of Technical training of the higher or collegiate sc.ip-tion; we now come to technical training in schools. First, there are the Medical Schools devised to impart a knowledge of Medicine and Surgery calculated to place its possessors above the mere empiricism of *baids, hakims, kobirages,* and other ignorant native practitioners. The great danger in these schools is a system of instruction too theoretical for the purpose in view. This danger was perceived some time ago in the Bengal schools, and steps taken to obviate it by simplifying the lectures and making them more tutorial, by insisting on more frequent examinations, and by more practical demonstrations. These improvements will, it is hoped, have the desired effect, but it would seem that in other provinces of the Empire as well as in Bengal the evils thus guarded against operate to a very great extent. It is desirable therefore that other Local Governments should be invited to consider the mode of instruction in these schools, with a view to rendering it more practical and intelligible to the class for whom the schools were devised. In neither Bombay nor Madras do these Medical Schools seem to be as popular as could be wished, and it would be gratifying to know that this apparent want of popularity is not due to defects of system, or to inefficient teaching. The matter is one to which the attention of these Governments might with advantage be called.

Attention has been called to the fact that the flourishing town of Rangoon is without a Medical School. So long ago as 1883 the want was felt; and in the May of that year the Chief Commissioner expressed the intention of soon supplying it. The want is still unsupplied; and the Administration of Burma may now reasonably be asked to attend to the matter.

72. As it is very desirable that medical aid for the people should be disseminated as widely as possible, attention may here be called to the fact that, while Bengal with its comparatively few

large cities possesses seven Medical Schools, the North-Western Provinces and the Punjab with their many great cities are content with two schools. In the single city of Dacca in Bengal there is one Allopathic and two Homœpathic Schools, and the competition is only productive of good. The Medical profession even in its lower grades affords to fairly educated men an excellent opening and independent career.

73. The success which has attended Survey Schools, wherever they have been established, is an encouragement to extend the system. There is in every district in India ample employment for competent surveyors, for the qualifications of the ordinary *amin* leave much to be desired. If after suitable Survey Schools had been provided, our Civil Courts employed, by preference, surveyors or valuators who had certificates from such schools, not only would an impetus be given to this description of technical education, but a great boon would be in course of time conferred on the people in the provision of a more respectable class of professional surveyors and valuators. Local Governments and Administrations might, therefore, be asked to take into their consideration this question of Survey Schools. An educational qualification should be insisted upon before a student is admitted to such a school. The character of the students and the reputation of the profession would thus alike be raised in the public esteem. Local Governments might also be asked to consider whether by degrees the surveyorships and valuatorships to Civil and Revenue Courts and authorities should be restricted to passed students of these Survey Schools.

74. On the question of Agricultural Schools and Colleges some opinion has been already expressed. Here all that need be added is that if such schools and colleges cannot now be provided, we should at all events do what can be done by an extension as far as funds allow of that system of agricultural classes in Middle and High Schools which is found to answer in Bombay. There is room for hope that conjoined with a system of public examinations this plan will in time supply a demand for higher and more systematic instruction in agriculture.

75. We now come to Art Colleges and Industrial Schools. The previous remarks made on this subject will have suggested that if these Art Schools in the Presidency towns and at Lahore have not as yet made much impression on the Industrial life of the country, it is not so much because their aims are untrue, as because they keep no touch with the Industrial system they are devised to assist and improve. On the other hand, the so-called Industrial Schools, modelled upon no considered plan, and cut off from communications with the Schools of Art which should be to them sources of inspiration and guidance, never rise above mere workshops for the production of inferior articles at extravagant cost. For all purposes of practical training they are useless; and it is no exaggeration to say that of the 45 Industrial Schools which now exist in India, hardly one serves any true educational purpose. If, therefore, anything effective is to be done in the way of Industrial training in Indian schools, we must begin anew and construct a system of industrial education. The question for decision is then, upon what principle and by what adaptation of means to ends can such a system be constructed?

76. Authorities * agree in thinking that the true principle from which to start is that Technical instruction must not be considered as something separate and apart from ordinary general education. On the contrary, it should be regarded as a development of such education. The scheme of general education should therefore be so arranged as without any break of continuity to lead up to the instruction which we call Technical. If this be the true principle on which to proceed, it is manifest that nowhere in India has our educational system given to that principle the prominence which it deserves. Leading, as it does, to University examinations and University degrees alone, our educational system has always concentrated attention on literary subjects and literary training. But as Technology is the study of the practical application of Science, a system of education which has for its aim the acquisition of literary knowledge only can never be a satisfactory introduction to technical instruction. As Science is the foundation of every branch of technical instruction, the principles of Science ought to underlie the education of those whose aim in life is the practice of the Industrial Arts.

* Report of the Royal Commission of technical education.

Papers by Professor Pedler of the Calcutta Presidency College and Professor Monday of the Sibpur Engineering College.

Reports of Mr. Grigg, Director of Public Instruction, Madras, of Mr. Tawney, Officiating Director of Public Instruction, Bengal, and of Mr. Lee-Warner Officiating Director, Bombay.

A pamphlet entitled "How to introduce National Technical education into India," by Mr. Dinshaw Ardisir Taleyarkhan (Baroda, 1884), contains some sensible suggestions.

77. Education will usually begin with "the three R's:" and it is, of course, necessary that some advance should have been made with the elements of language and mathematics before progress can be made with even rudimentary Science. But all authorities agree that the study of drawing should be introduced at the earliest possible age; that it should be placed on the same footing as writing; and that it should be continued throughout all subsequent stages of the student's educational career. The Royal Commissioners on technical education are at great pains to enforce this principle:—

> "Your Commissioners," they say, "are of opinion that sound instruction in the rudiments of drawing should be incorporated with writing in all primary schools, both for girls and boys, by which also, according to the experience of competent authorities, the writing would be much improved. Something in this direction has already been done in many good infant schools, where children of the age of six draw triangles, squares, oblongs, etc., on their slates."

78. When some progress has been made in "the three R's," attention should be directed to Elementary Science.

> "For the great mass of our working population," write the Royal Commissioners, "who must necessarily begin to earn their livelihood at an early age, it is essential that instruction in the rudiments of the sciences bearing upon Industry should form a part of the curriculum of the Elementary Schools, and that instruction in drawing, and more especially in drawing by rule and compass, of a character likely to be useful to them in their future occupations as workmen and artizans, should receive far greater attention

than it does at present. The importance of the first of these subjects has been so far acknowledged by the Education Department, that in all infant schools simple lessons on objects and the more commonly occurring phenomena of nature have been made obligatory. This system of instruction, if properly illustrated by the object itself or of diagrams or models of the same or by the simplest kinds of experiments, is an excellent foundation for the subsequent teaching of Elementary Science."

And again:

Geography, if properly taught, is a branch of Elementary Science which need not be separated from Science generally, and can well be taught along with the other branches of Science by means of object lessons. In this way the connecting link between Science as taught in the Infant School and in the higher division of the Elementary School will be supplied.

A preliminary education founded on the preceding principles would form the most appropriate introduction for all forms of technical instruction that could be devised, while it would help to give to the education of those not intended for Industrial pursuits that practical character which is now so wanting. Children under such a system would have their faculties of thought and observation trained, while now the only faculty that is trained is the memory.

79. Following on such a preliminary education, of which Reading, Arithmetic, Writing, Drawing, and Elementary Science would form the prominent features, would come that separation of studies which the student's proposed career in life would necessitate. Those who were intended for the learned professions, the Bar or Medicine, would follow the literary courses which lead to the existing Entrance Examination of the University. Those who looked to Art or Engineering, or Commerce or Agriculture, would pursue the "modern" curriculum advocated by the Education Commission, and leading to an alternative Entrance Examination which the Universities should without unnecessary loss of time be invited to establish. Those who looked to Industrial pursuits would enter the Schools of Technical training, if indeed they did not select to push their preliminary education still further by going through the "modern" curriculum. These three divergent courses should take off from the common stem at the end of the Middle School course, as recommended by the Madras Government. The High or Zillah Schools would thus in all cases consist of a "literary" and a "modern" side, which is in full accord with the recommendations of the Education Commission and with the declared policy of the Government of India.

80. It will be observed that the Royal Commissioners recommend the introduction of Drawing and Rudimentary Science into the curriculum of Primary Schools. We must not, however, be misled by identity in nomenclature into thinking the enforcement of such a recommendation possible in all Indian Primary Schools. The Indian Primary School is a very multiform entity indeed. In Bengal, where primary education proceeds on the basis of controlling and by degrees improving Indigenous Schools, teaching in the old native plan, the introduction of Drawing or Science lessons into the Village School or *pathsala* would be at the present moment wholly premature and impossible. The schoolmasters are unfit to teach such subjects. In Bombay, on the other hand, where very many of the Primary School teachers have passed through training institutions, and teach on approved methods, the introduction of drawing, etc., into the school curriculum might possibly be enforced. What is suitable for one part of India may be unsuitable for another part: and we shall miss our end if we strive after uniformity which is not attainable. While making due allowance for such local peculiarities as those referred to, and while permitting the utmost freedom to provincial and local endeavours, it seems that for the present we should leave the Indian Primary School out of our consideration; and that in any change of system or addition to the curriculum that may be determined upon the Government of India should not aim at going lower down in the scale than the Middle school. But in every province we should operate through the Middle School (and *à fortiori* through the High School) whether it be founded on an English or on a Vernacular basis. We shall thus circumscribe our efforts, which in a novel undertaking is always desirable; and we shall appeal to a higher degree of intelligence in our students while counting on a more instructed class of teachers.

81. The Middle or High School student, who is able to read, write, and cast up accounts, and has been grounded in the rudiments of Science in addition to knowing something of Drawing, now looks about for a school in which to prosecute his technical education. It will simplify the difficulty of providing such a school if we first consider what should be taught our student in the school he is looking for.

82. The various industries or professions which may be made the subject of technical education are classified by Professor Pedler, of the Calcutta Presidency College, under four divisions:—

A.—Applications of Science.

B.—Applications of Art.

C.—Agriculture.

D.—Commerce.

With Agriculture and Commerce it is not now proposed to deal.

The industries classed as "Applications of Science" admit of a further division into five heads:—

(*a*) Industries dependent on the application of Chemistry, such as dyeing, printing, textile fabrics, paper-making, sugar-refining, glass manufactures.

(*b*) Industries dependent on the application of Physical Science, such as electro-engineering, electro-metallurgy, *etc.*

(*c*) Industries dependent on the Sciences—geology, metallurgy, mining.

(*d*) The textile industries which depend partly on physical, partly on mechanical science.

(e) Mechanical industries, such as manufacture of cutlery, locks, screws, electro-plating *etc*.

The training necessary for those who intend to follow the industries coming under the designation of Applications of Art may be sub-divided into—

(a) training for architects, artists, draughtsmen, designers;

(b) training for engravers, wood-engravers;

(c) training for modellers and manufacturers of pottery;

(d) training for furniture and wood-work manufactures.

83. The preceding classification may be considered for present purposes to exhaust the subjects on which technical training will be in request for many years to come in India. Indeed, it is obvious that many of the industries are still questions of the future. Some of them, however, are matters of present interest; others of them, though of prospective importance, have now to be provided for; and the question is, how are we to establish the schools in which the necessary instruction can be imparted to students desirous of making a livelihood by the practice of such industries?

Putting out of consideration for the moment the important question of finance, two difficulties here present themselves—the difficulty of obtaining competent teachers, and the difficulty of incorporating the school when we have found our teachers with the educational system of the province. The Government of Madras hope to overcome the first difficulty by the operations of private enterprise. They expect, by the establishment of a system of public examinations, to create a demand for trained teachers, and by the effect of this demand to produce the necessary supply. It is probable that the expectations of the Madras Government will be largely fulfilled. This means of stimulating education should therefore not be neglected in provinces outside Madras; but other Local Governments should also be invited to supplement arrangements for training teachers by a system of examinations calculated to stimulate a demand for them. And in this connexion the question arises, whether efforts should not be made to induce the various Universities to undertake the examinations, and thus afford a further evidence that technical instruction has been made an integral part of the education of the country. This is a point to be referred to at greater length later on. Here it may be said that there is unquestionably great force in the view that examinations should be conducted by the Universities, and not by the Government through Boards constituted for the purpose. The Universities have become a power in the land. They are looked up to and revered by the educated classes. If they can be moved to identify themselves with this movement in favour of technical education, their countenance will more than any other influence tend to counteract and abate those feelings whose nature and force Mr. Kipling (a competent authority) thus describes:—

> The prejudice against manual labour which exists among the upper classes is still stronger than many of us are apt to think; and when we speak of Art, its beauties, refining influences, etc., we do not reflect that for centuries the most important subjects that our school teaches have been set down in the Kama Shastra among the 64 accomplishments—mostly trivial—in which the public women, or Hetairæ of the country, are supposed to be proficient; while philosophy, religion, poetry, *belles-lettres*, administration, etc., were considered the only pursuits to which a man of position should seriously apply himself.—(*Report on Mayo School of Art for 1884-85.*)

84. But, though we may agree to invoke the aid of examinations in the general direction indicated by the Madras Government, we should not trust to that plan alone. It is therefore most desirable to make all the use we can of existing Training Institutions, with a view to turning out competent masters, and to spare no reasonable expense in the way of stipends while the teachers are at the Training Schools, and of good pay afterwards to attach them to our service. It is to the employment as teachers of persons, themselves untrained, to train others, that much of the discredit has arisen that now attaches to Technical Schools.

85. Having procured our teachers in one or another of the ways indicated in the preceding paragraph, we have now to see how our schools are to be established. For the establishment of schools the Madras scheme trusts much to private enterprise. The ultimate effect of private enterprise in creating such schools as we want may be considerable, but it is clear that the operation of that agency will be slow. In this matter of technical instruction the Government must pioneer the way, as it has pioneered the way in almost every enterprise which has changed the aspect of Indian life. If progress is to be made at once, the Government must, on fit opportunity and with due regard to local circumstances, establish in every division or district a Technical School or a Technical Department of a school to which the instruction imparted in the "modern" side of the Middle or High School will furnish a fitting introduction.

86. The school so established must be an integral part of the educational system of the province. If past experience proves anything, it seems very clearly to prove the utter hopelessness of expecting that from isolated Industrial Schools any general good can come. On this point special attention is invited to the opinion of Mr. Tawney, Officiating Director of Public Instruction in Bengal. What Mr. Tawney says of Bengal is equally true of every other province of the Empire.

> The institutions were isolated and out of connexion with the general system of education in Bengal. They had no prestige of any kind attaching to them, and were therefore unable to make way against the general current of native prejudice. They were insufficiently supplied with funds, and no bright prospects were opened, even to the most successful of their pupils, resembling those lying before the more distinguished pupils of the School of Naval Architecture and the Economic School of Mines. *If they had been furnished with schools leading up to them, in which the head and eye were trained to do their work efficiently*, and if they had been in any way connected with the system of education centralised in Calcutta, their fortunes might have been different.

As it is, I cannot believe that these efforts have been completely thrown away. There can be no doubt that the horizon of young India is widening; that a great many of the more energetic of our native youths are beginning to be dissatisfied with a purely literary education and an official career under Government, and are eager to take part in undertakings which shall advance the economic welfare of their native land. They naturally look to the Government to give a definite aim to their aspirations, and to furnish the machinery necessary for their realization.

87. If, therefore, our Industrial Schools are to lead to any practical good, they must be an integral part of the Provincial educational system. The District Industrial School must be a department of the District High School; all the prestige which attaches to the High School must attach to it, and so on with all other Industrial Schools in their various degrees. Furthermore these Industrial Schools must be linked to a Central Institution, which should be the highest embodiment of instruction in the particular art or industry with which the school is concerned. This Central Institution, be it the Presidency School of Art or the Engineering College, must not only direct and control the teachings of the schools scattered throughout the province, but inspire them with new ideas and furnish them with good designs. For the schools which come under Division B on page 62 above, the various Schools of Art at the Presidency towns and at Lahore at once furnish the Central Institution which is required. For the schools which should fall under Division A, no Central Institution at present in existence may serve all purposes of control and direction; but the Engineering Colleges will, at all events, serve the purpose to some extent.

88. Even at the risk of repetition and prolixity, the present writer would most strongly urge the view, which is, indeed, confirmed by the experience we have had upon this question, that no system of Industrial Schools can possibly work in India which does not proceed upon the principle that all Technical Schools of a particular class shall depend on, and be subordinate to, a Central Institution. No Industrial School should be established except with the concurrence of the Director of Public Instruction and of the Principal of the Central Institution. These officers should decide whether in a particular locality an Industrial School is wanted, and they should prescribe its curriculum when the school is established. The Central Institution, whether we call it a School of Art or a Science and Art Department, should gather up in itself all that is best in the Art and Industrial traditions and workmanship of the province, and it should be enabled to attach to itself by stipends and scholarships all promising pupils, some of whom would doubtless adopt the profession of a teacher. The Central Institution should decide, in communication with Local Boards, District Officers, and Directors of Agriculture and Commerce, when a particular industry in a particular place needed encouragement and training; and the expense of the school then established might reasonably be in whole or part a charge on local funds. This scheme will, if approved, work in with the system of Economic and Industrial Museums, which has recently been engaging the attentions of the Government of India, and, among Local Governments, more especially of the Government of Bengal.

89. It has been said that the difficulty regarding teachers is one which cannot be overcome immediately. It is fortunate, however, that it does not arise so much in connexion with the training in the Central Institutions, and therefore the concession of liberal support to the Central Institutions is of prime importance at the present moment. Hitherto our Schools of Art and, it may be added, of Engineering have not been richly endowed; now they should be freely supported. No doubt public liberality and beneficence will, if appealed to, also largely help in this good work, as it has largely helped in the cause of Literary education. The advantages of Literary education are perceived by all, and not only has the Indian public come forward most generously to endow Literary Colleges and Schools, but private enterprise has seen in the establishment of such educational institutions the means of competent livelihood, and of an honourable and useful career in life. Indeed, it has thus come to pass that private enterprise in such educational undertakings is so well to the front, that there are not wanting indications that Government is occupying a field which, if abandoned, would be taken possession of by independent agencies. The Education Commission has advocated the gradual abstention of the Government from the work of higher education in India; and though this abstention must not be practised except where the interests of higher education can be safely entrusted to other hands, the accepted policy on the point must not be forgotten. It will be possible on suitable opportunities, in pursuance of this policy, to hand over some schools and colleges to private enterprise. Large funds may not be at first set free, for local bodies must be treated liberally in undertaking fresh responsibilities; but ultimately the entire cost of the schools and colleges transferred will be available for the promotion of technical education.

90. It has been stated above that the public examinations in technical and practical subjects which it is proposed to inaugurate should be conducted not by Government, but by the University in each province. This is also the opinion of Mr. Tawney, the Officiating Director of Public Instruction in Bengal, who in this matter is justly entitled to a respectful hearing. In a recent report which supports most of the positions contended for in the preceding remarks, Mr. Tawney observes as follows :—

> 1. I have always thought that the only way to make technical education really popular is to induce the Calcutta University to take it up. No subject that is not recognized by this body can in the long run hold its place in schools. It is idle to imagine that, when schools are made over to District Boards, these bodies will keep up teachers of subjects that the boys do not wish to study and their parents do not wish them to study. But the University can always create a demand for the teaching of any subject by simply introducing it into its examinations. Now there is one subject which all authorities on technical education consider indispensable, namely, Drawing. Messrs. Pedler, Schaumburg, and Monday would have it introduced into all schools. They are agreed that the training which this subject gives to the hand and eye constitutes the most useful preparation for technical instruction. Mr. Pedler would have it taught (as is, I believe,

done in Germany) along with writing. On this point the late Mr. Locke wrote (report for 1878-79): "We have to begin—absolutely at the beginning—blackboard work with our new students, which is as though at the Presidency or Medical College the students had to begin their course by learning to read and write. This state of things will doubtless continue as long as simple outline drawing (of the most elementary kind) is not placed beside reading and writing as part of the instruction in every school, even the humblest, receiving Government aid. It has been so in England for the last twenty-five years. No parochial schoolmaster can get a certificate unless he can teach the drawing of simple figures on the blackboard." I may mention that all the works on technical education in Europe that I have been able to consult hold similar language with regard to the importance of drawing.

Now Government might perhaps induce managers of schools to appoint teachers of this subject by offering to pay their salaries and giving prizes and scholarships for proficiency in it. But the University can bring about the same result by simply paying a gentleman to examine in it. Examination is the central idea of Mr. Grigg's system, and I am only imitating his example in insisting upon the great power of this agency in India. But I think it particularly important that the examination which I would introduce should be conducted by the University. I therefore recommend that the University of Calcutta be asked to institute an alternative Entrance Examination of a practical character, somewhat resembling the final examination in Schedule I of the Code for European and Eurasian Schools. I would propose the following subjects for this examination:—

1. Mathematics as at present (including, be it observed, Mensuration).
2. History and Geography as at present.
3. Elementary Physics.
4. Elementary Chemistry.
5. Mechanical Drawing.

I would compel all students, who propose to take up Engineering, to pass this examination, but no others. Many would take it up to escape the technicalities of English grammar, and the much dreaded second language. It might be asked why I exclude English. I answer that I would have all the papers answered in English; but my experience teaches me that the study of a literary master-piece does not always give a command of ordinary every-day English, and that it is a great strain upon the students. I regard the play of Shakespeare in the final standard of Schedule I as rather unnecessary. But it is of course easier, or ought to be, for a European to get up Shakespeare than for a native of this country. The subjects I have introduced need, I believe, no apology. I would not prevent any one who passed this examination from going on to the ordinary First Arts Examination, if the University did not wish to provide an alternative course in this also. I believe that this proposal would meet with a ready acceptance in the Senate. It is possible that the Faculty of Medicine would prefer this entrance course to that now required as an introduction to the study of that Science. I may remark that at present every student must acquire a good knowledge of Physics in order to pass the First Arts Examination, and that the B course of the B. A. Examination is mainly scientific, though the subject of English literature is unfortunately still retained in it.

Should the above proposal be accepted, it will perhaps be necessary to introduce some teachers of drawing into those Government Schools* that are not immediately made over to District Boards. But it is clear that we shall never obtain a really high class of Technical instructors until the Central College recommended by Mr. Pedler is established.

91. Mr. Tawney's remarks suggest that the proposals which he advocates for the promotion of technical instruction can be carried into effect without difficulty or material change in the existing system. In confirmation of this view, the following passage is quoted from the Minute by Professor Pedler, to which reference has already been made. It expresses the view that His Excellency's intentions in this matter can be carried into effect, at all events in Bengal, without any dislocation of the existing educational arrangements. To give full effect to the new plan, additional training facilities will no doubt be needed: but if this be not considered a question of the immediate present, it may well be entrusted to the care of those who will succeed His Excellency in the government of the Empire:—

If then the greater part of technical education is or should be merely an extension of ordinary education in particular directions, the question naturally first arises whether technical instruction should necessarily be given in separate or special schools, or whether the institutions devoted to the general purposes of education could not be utilized to a large extent for imparting the earlier portions of technical training. There would certainly seem to be no reason why the institutions which are already giving education in India with a view to entering into a college, or with the final aim of the student attaining a University degree, should not by a very slight modification of their system of teaching be made to embrace the required teaching of Elementary Science, of Drawing, Design, etc., which are the elements on which all technical instruction is based; and further, there would appear to be no reason why the further study of pure Science, both practically and theoretically, which is the first step to the higher technical instruction, should not be carried on in such existing institutions as the Government Colleges, etc., by

* Also in District Board Schools. This is essential, as Aided and Middle Schools are made over to District Boards by the Bengal Self-Government scheme.

perhaps a slight enlarging of the sphere of work and a slight strengthening of the staff. Up then to the final stage where the Technical student requires to be taught the practical application of Science, or of general principles to the actual work or industry which he will afterwards have to practise, there is no reason at all why the present educational institutions, slightly modified and extended, should not carry on the work required. But in order to carry out the final part of the training, no facilities to any extent at present exist in India; and thus the final and most important part of the training will have, if the work is to be thoroughly well done, to be separately provided for by the creation of new institutions. It is true that this part of the training could also be given by a very considerable expansion of educational institutions at present existing, and this would probably be the most effective way of proceeding and of utilizing the existing organization for education; and, if such a simile can be used, the manner of expansion will be similar to that which took place in education in Bengal, as regulated by the University examination, some fifteen years ago, when to the purely Literary education which had previously obtained the study of Science was affiliated, though in a theoretical and unsatisfactory manner; and now what is required is to give greater facilities and opportunities for the practical study of Science, and to affiliate on to it the study of the practical application of Science or of general principles, and thus to provide instruction in Technology.

92. It may be convenient to summarize here the chief recommendations which seem to emerge from the preceding remarks. These are—

(1) that enquiries be made whether it is not desirable that greater facilities for the study of Law and Medicine be provided in mofussil Colleges in Madras and Bombay;

(2) that the teaching staff of the Agra Medical School be strengthened and the status of the school raised to an equality with that of Lahore;

(3) that a Medical School be established at Rangoon;

(4) that the instruction in all Medical Schools be made more practical than at present;

(5) that facilities for practical training be provided at the Roorkee and Madras Civil Engineering Colleges;

(6) that an Art School on the Lahore plan be established at Agra;

(7) that opportunity be taken, where possible, to establish Agricultural and Veterinary Schools or classes in High Schools;

(8) that more attention be paid to the teaching of land surveying; and that Civil Courts and other official bodies be required to employ certificated students of such schools in preference to non-certificated surveyors;

(9) that instruction in drawing be made compulsory in all schools the teachers of which are competent to instruct in drawing;

(10) that competency to teach drawing be made as soon as possible an essential qualification in all teachers in Middle and High Schools;

(11) that instruction in introductory science (the particular subjects or branches to be prescribed by the Education Department) be made compulsory in Middle and High Schools, similar provision being made as in the preceding head regarding teachers;

(12) that examinations in Middle Schools include drawing and elementary science as compulsory subjects; and that a considerable latitude as to optional subjects of a practical character be allowed as in the Madras syllabus (paragraph 62 of this note);

(13) that the High School course be of two kinds—(*a*) literary, (*b*) practical or "modern," as recommended by the Education Commission;

(14) that to Middle or High Schools there be attached a Technical Branch whenever enquiry brings to light the demand for technical training in any industry in the locality;

(15) that such Technical Branch be an integral part of the Provincial educational system, subject to the control of the Education Department, and leading up to an examination to be instituted by the University;

(16) that, subject to the general supervision and control of the Department of Education, such Technical Schools be under the direction as to curriculum, etc., of the Central Art College (which should be affiliated to the University) or Engineering Colleges of the Province, as the case may be;

(17) that the University establish two Entrance examinations—one literary, as at present; one "modern," as recommended by the Education Commission. The "modern" examination to include optional subjects to meet the requirements of Division A and Division B of paragraph 82 of this note;

(18) that funds be provided for the promotion of the foregoing scheme by State grants when possible; and by appropriating some of the allotments now made to the support of higher English education, wherever this can be done without detriment to the interest of that education. That Municipalities and Local Boards who are chargeable with the support of education be also required to allot funds for Technical Schools, where the establishment of such be considered desirable.

93. All has now been said which occurs to the writer to say in fulfilment of the Viceroy's commands. In conclusion, it may be observed that, although among the higher caste natives of India the obligations of caste still give a *quasi*-religious sanction to the distinction between the employments deemed menial and those deemed honourable, there are, nevertheless, indications that this sanction is losing something of its force, and that natives of all castes are in increasing numbers looking to Technical education as affording an honourable livelihood and career in life. It is submitted that it is desirable to assist and encourage this popular feeling; that room exists for

improvement in almost every department of technical instruction in India; and that the time is ripe not only for calling on Local Governments to take the matter up in earnest, but for indicating to them some of the directions in which improvement seems possible, and from which funds can be obtained for effecting it.

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# *No. 2—Resolution on Industrial Education and an Industrial Survey of India.*

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*Extract from the Proceedings of the Government of India in the Home Department (Education)—under date Simla, the 18th June 1888; being a Resolution of the Government of India upon Sir A. Croft's Review of Education in India in 1886.*

22. In paragraph 12 above reference was made to industrial schools. Upon this subject the Government of India in 1886 circulated a memorandum to all Local Governments and Administrations, in which the position of industrial schools was set forth, and it was shown that hitherto little progress of a substantial character had been made in promoting technical education. Since then the subject has received much attention both from the public and the various Local Governments. Technical education has been brought into prominence by the pressure of two sets of considerations, which, though cognate, are not identical. In the first place, it had been observed that the object of the Education Despatch of 1854, that "useful and practical knowledge suited to every station in life" should be "conveyed to the great mass of the people" of India, was not being attained by a State education too purely literary, and leading too exclusively to literary culture. It was accordingly recommended by the Education Commission, and accepted by the Government of India as a reform to be desired, that a secondary school course should be introduced, which should fit boys for industrial or commercial careers. This recommendation however, though in the right direction, was wanting in the precision necessary in a working rule, and to give it requisite definiteness, it was suggested in the memorandum of the Home Department, referred to above, that drawing and the rudiments of the sciences should be taught in all but the most elementary schools; and that generally throughout the educational system the study of natural science and the cultivation of the faculty of observing and reasoning from observation and experiment should be encouraged. In other words, it was suggested that studies which may incline to the application of natural science and to scientific research should not be neglected in favour of literature.

23. The second class of considerations which have forced this question into prominence is concerned with the need of industrial occupation for a population rapidly outgrowing the means of support supplied by a too conservative system of agriculture. It is also concerned with the need for scientific methods to develop the material resources of India and to improve its agriculture, its products and manufactures, so that they may better hold their place in the markets of the world, where competition is carried on with an intensity of purpose, which has been compared to the conditions of warfare. But technical education in this latter sense—that is, in the sense of industrial education—is a matter not so easily dealt with as the technical education of the general preliminary character referred to in the preceding paragraph; and it therefore seems desirable that if the present impulse in its favour is to be successfully directed, the conditions of the question should be clearly understood.

24. Technical education proper is the preparation of a man to take part in producing efficiently some special article of commercial demand. It is the cultivation of the intelligence, ingenuity, taste, observation, and manipulative skill of those employed in industrial production, so that they may produce more efficiently. And thus technical education of the special, as contradistinguished from the preparatory, kind is an auxiliary of manufacture and industrial capital. In India at the present time the application of capital to industry has not been developed to the extent which in European countries has rendered the establishment of technical schools on a large scale an essential requisite of success. But the extension of railways, the introduction of mills and factories, the exploration of mineral and other products, the expansion of external trade, and the enlarged intercourse with foreign markets, ought in time to lead to the same results in India as in other countries, and create a demand for skilled labour and for educated foremen, supervisors, and managers. It may be conceded that the effect of these various influences on an Asiatic people is very gradual, and that it would be premature to establish technical schools on such a scale as in European countries, and thereby aggravate the present difficulties, by adding to the educated unemployed a new class of professional men for whom there is no commercial demand.

Still a large field is open for the action of Government and public liberality in the direction of promoting special technical education suitable to the immediate requirements of the country and capable of expansion with its growing necessities.

**No. 2. Resolution *re* Industrial Survey, 1888.**

25. The practical conclusion, then, which the Government of India draws from the foregoing premises is, that it should support technical education as an extension of general education in the sense indicated above; and, furthermore, that it should promote and countenance such technical education of a special character as may be applied to the service of existing industries, which will profit by the aid of scientific research, scientific method, and higher manipulative skill.

The field of operation being thus defined, it would seem necessary to begin with industries which are in some degree centralized, which are growing into importance with the new growth of trade and manufactures, and which are capable of improvement by the application of scientific principles to materials and processes. At the centre of such industries a technical school will be useful. To the great railway workshops and factories may with undoubtedly great advantage be attached schools of drawing and design, and of practical instruction in the scientific principles of the handicrafts there carried on. And probably in large stations and municipal towns there will be a demand which will repay those who acquire in local industrial schools superior skill. If caution at the beginning secures success; if capital is tempted by degrees to launch itself in commercial enterprises and the development of the material resources of the country; if a larger demand for the products of skilled labour springs up—then larger developments of special technical education may be fostered in complete harmony with the sound principle that supply should follow demand.

The subject is of such extreme importance, and the insignificance of what has been attempted in India is so conspicuous, that the Governor General in Council is deeply impressed with the necessity for action in whatever way may be practicable and sound. Some Local Governments have indeed recently taken practical measures to promote technical education, and these measures have been viewed with much satisfaction by the Government of India. But as it is desirable that the step best calculated to promote technical education should form the subject of continuous enquiry and discussion, the Governor-General in Council suggests that Local Governments and administrations should on a convenient but early opportunity take action in two ways. Impressed with the existing want of information at hand as to the extent, character, and circumstances of important local industries in every province of India, His Excellency in Council would, in the first place, suggest that in each province an industrial survey should be completed. In the second place, he would recommend that, with a view to turning the knowledge acquired by such a survey to the best account in the light of the abundant information contained in the Report of the Royal Commission on Technical Education, each Government and Administration should form a committee of educational experts and professional men, who should make suggestions from time to time for the auxiliary supply of appropriate means of technical education; for such modifications of the State system of public instruction as may aid and encourage industries and industrial employment up to the full measure of such requirement at each provincial centre as may be found to exist; and, when the circumstances are opportune, for the establishment of a Technological Institute, tor the enlargement of the provincial Schools of Art and Design, and for the larger co-operation of the University in the promotion of the object in view.

In furtherance of these suggestions, much valuable aid can be rendered by the various Provincial Departments of Land Records and Agriculture upon which the Resolution $\frac{6}{340-50}$ of 8th December 1881 laid the duty of promoting new industries, and of leading the people to a fuller knowledge of agricultural science.

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## *No. 3—Letter from the Government of India to all Local Governments asking what steps have been taken regarding the Industrial Survey.*

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No. 14—457-66, dated the 2nd November 1888.

From—A. P. MacDonnell, Esq., C.S.I., Secretary to the Government of India,

To—All Local Governments.

I am directed to invite attention to paragraph 25 of this Department Resolution No. 199, dated the 18th June last, on Sir Alfred Croft's Report on the state and progress of education throughout British India and to enquire what action has been taken in . . . . towards carrying out the suggestion therein made for the completion of an industrial survey.

**No. 3. Reminder *re* Industrial Survey, 1888.**

2. The favour of an early reply is requested.

# BENGAL.

## *No. 4—Letter regarding possible reforms in the Seebpore College.*

**No. 4. Seebpore College enquiry, 1889.**

No. 12 T.—G., dated the 3rd June 1889.

From—P. NOLAN, Esq., Secretary to the Government of Bengal, General Department,
To—The Secretary to the Government of India, HOME DEPARTMENT.

In a Resolution of the Government of India, Home Department, No. 199, dated the 18th June 1888, a suggestion was thrown out that a technical survey might be instituted with advantage in each Province, and the attention of this Government was again drawn to the subject by your letter No. 14—459 G., dated the 2nd November 1888. In my reply No. 934, dated the 8th December 1888, I stated that the issue of orders was deferred pending the result of an enquiry then in progress as to the reforms possible in the Seebpore College. The Committee appointed to conduct that enquiry has since submitted a report, a copy of which, with the proposed Government Resolution thereon, is appended.

2. The proposals of the Committee involve a considerable saving to Government by the abolition of the Seebpore Workshops, and this sum would be available for procuring apprenticeships for students and generally for the promotion of technical education. The Lieutenant-Governor does not, however, think that the scheme is complete in regard to the essential point of providing a substitute for the present system of practical training in the Workshops, and on this subject desires to make further investigation.

3. As such an enquiry would partake of the character of the technical survey proposed by the Government of India, I am to suggest that the two subjects be dealt with together, an officer being placed on special duty to ascertain what industries in this province offer prospect of remunerative employment to young men educated in the country, and whether students can be properly trained for such employment on the system proposed by the Committee. He would receive, at the expense of Provincial funds, Rs. 200 a month, in addition to the pay, acting allowance, and travelling allowance to which he would be entitled in the regular line. Thus, if a member of the Civil Service of the rank of Joint-Magistrate officiating as Collector be selected, he would get, while on deputation, the pay of that grade, with Rs. 200 a month additional, and also travelling allowance under the rules.

4. It is not proposed to make any very minute survey, and for the object aimed at, a deputation lasting about four months would probably suffice. The industries from which natives of Bengal are at present excluded by their want of technical education are indicated clearly by the fact that European mechanics and overseers are employed in them.

5. I am to request the favour of sanction to the proposed deputation, as also of any further suggestions or instructions which the Government of India may desire to offer for the conduct of the enquiry.

## *(a) Extract from the report of the Committee appointed by the Government of Bengal for the purpose of suggesting any alterations which it may be desirable to introduce in the course of studies pursued at Seebpore and the method of instruction adopted.*

The Committee does not consider that the extension of the college at Seebpore as a general school of technical instruction is practicable. In its opinion such schools, to be successful in India, must be established in large trade centres, offering as a free gift general means of instruction to the workmen employed in neighbouring factories. But although the situation of Seebpore is unsuitable for a general technical school, the Committee is of opinion that the utility of the College may be appreciably extended by the formation of additional classes for the training of youths for callings in which special theoretical knowledge is required.

The Director of Agriculture has specified certain callings connected with that Department for which a special education is necessary, and has laid before the Committee a note (Appendix D) in which an outline is given of the course of study the pupils would require to go through, and a

rough estimate is made of the cost of forming and maintaining the additional classes. The Committee considers that all the classes mentioned by the Director could be formed without difficulty at Seebpore with the exception of the Veterinary classes. These latter would, in the opinion of the Committee, be more efficient if they were attached to a hospital for sick cattle and located on the Calcutta side of the river, than at an inaccessible place like Seebpore.

The necessary accommodation for any of these additional classes which it may be decided to form at Seebpore can be made available by converting the workshop buildings into lecture theatres, class-rooms, and laboratories. The main building of the workshops is amply sufficient for these. The carpenter's shop, which is specially well lighted, could at a very small outlay be converted into an admirable drawing hall, and the contiguous store sheds, if turned into a model-room, would supply an important element in the means of efficient instruction, which has hitherto been withheld from the college. The large sheds in which the forges are now placed can, at a comparatively small outlay, be converted into quarters for students in the subordinate branch of the Agricultural department of the college, and the present foundry into an agricultural museum.

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## *(b) Note on Seebpore College and proposal to establish a Bengal College of Science and Art by Mr. M. Finucane.*

The capital outlay on the buildings of the Seebpore College, and the maintenance and repairs thereof from 1879-80 to September 1887, according to the figures furnished to me by Mr. Spring, amounts to Rs. 7,87,434, and the interest thereon at 4 per cent. to Rs. 1,79,626, making a total of Rs. 9,67,060.

The cost of the College staff during the same period is given at Rs. 4,23,748, so that this institution has from 1879-80 up to date cost altogether Rs. 13,90,808.

The total number of passed engineers turned out is 33, and of subordinates 68, making altogether 101 passed students; so that if the total outlay were distributed over the total number of passed students, we should find that each student who completed his college course has cost Government Rs. 13,770. If the gross outlay were distributed among the number of qualified engineers, excluding subordinates or overseers, the cost of each engineer to the State calculated in this way would be over Rs. 40,000. The actual net cost of the education of each pupil cannot, however, be fairly calculated in this manner, for the buildings remain and are worth a considerable sum, though if sold they probably would not realise anything like what they have cost, and some amounts have been received in fees from the pupils which, as well as the present value of the buildings, would have to be deducted from the gross outlay in order to arrive at the true figures showing the cost of each pupil. It is also to be noted that 1,027 students entered the college and possibly benefited to some extent by the partial education they received in it, though they did not complete the prescribed course of training.

2. The figures showing the real cost of each passed pupil would appear to be fairly estimated thus—

| | Rs. |
|---|---|
| Total capital outlay on building . . . . . . . . . . | 7,87,434 |
| Interest on above outlay, maintenance charges, and wear and tear of buildings, at ten per cent., being amount chargeable to annual cost of pupils turned out any one year . . . . . . | 78,743 |
| Cost of College staff after deducting receipts on fees for seven years, Rs. 3,86,540, or per annum . . . . . . . . | 55,220 |
| Total cost per annum . . . . . . . . . . . | 1,33,963 |
| Average number of passed pupils turned out per annum being 15, the cost of each pupil is . . . . . . . . . . | 8,930 |

It will be observed that in this sum is not included loss on the workshops (amounting since 1879 to more than Rs. 3,50,000) which I understand are kept up mainly for the benefit of these students. If this item is taken into account, it would appear that each passed student will have cost the State Rs. 12,390, a sum which would be sufficient to pay for sending them to England and having them educated there at the best Engineering Colleges, instead of being turned out inferior engineers or subordinates at Seebpore. But not alone has the cost per head of the pupils' education been very great, but it is also to be remembered that of the 101 passed students included in the above calculation, only 33 have been turned out as engineers in seven years, while 68 are shown as subordinates or overseers. No information has been furnished regarding the employment of the engineers and subordinates after they left the college, and it is not therefore possible to say to what extent they have followed the profession for which their training has been so dearly purchased by the State.

No. 4. Seebpore College enquiry, 1889.

3. Assuming, however, that they are useful members of society, and that they are now following the profession of engineering, it is still evident that the benefits which the public derive from the services of these 33 engineers and 68 subordinates are altogether incommensurate with the outlay incurred by the State on their education. When it is borne in mind that the college is profusely liberal in offers of scholarships and freeships, not included in the outlay mentioned above, and that the total number of students who passed out of the college per annum is not more than 15, while there are no less than 70 free studentships and 50 scholarships open to its students, of the value noted in the margin, costing Rs. 1,935 a month, and when it is remembered also that the average number of passed students is not equal to the average number of freeships and scholarships, it must be admitted that the Seebpore as an Engineering College has completely failed.

*(A).—For the Engineer Department.*

1. One Junior scholarship of the value of Rs. 20 a month
Three of Rs. 15 a month,
Six of Rs. 10 a month,
all tenable for two years.

2. Senior scholarships of the same number and value.

3. Two Forbes' scholarships of the value of Rs. 10 a month, each tenable for one year.

4. Two graduate scholarships of the value of Rs. 100 each, and six of Rs. 50 each, are awarded on the result of the University Examination for degrees and licenses in Civil Engineering.

*(B).—For the Mechanical Apprentice Department.*

1. Ten scholarships of Rs. 10 and ten of Rs. 6, each tenable for one year and-a-half.

2. Five European or Eurasian students are boarded free at a cost of Rs. 26 each, and twenty-five are boarded partly free at a monthly cost of Rs. 15 each.

3. Forty native apprentices are boarded partly free at a monthly cost of Rs. 5 each.

Either there is no sufficient demand for the education and training provided for engineers and overseers in the college, or, if there be such demand, it is not met by the college as at present constituted.

4. I had thought, before obtaining these figures, that it might be possible to extend the usefulness of the institution by merely adding an agricultural class, while leaving its general character untouched. In view, however, of the figures quoted above, it appears to me to be very questionable whether the failure to attract students has not been so great and conspicuous as to make it a question for the Committee's consideration whether any mere patching of the existing institution will suffice, and whether it is not expedient and necessary that the college should be altogether reorganized, and the character of the instruction to be given in it entirely remodelled.

5. The remark is made in the papers before the Committee that there is too much of engineering in Seebpore, and too little of other things for which there is probably more demand and certainly more need. It seems to me that the remark is a just one. I would therefore suggest, for the Committee's consideration, the question whether the college may not with advantage be converted into a General Technical College, or a College of Science and Art for Bengal. The outlay now incurred in turning out a few inferior engineers may probably be made to suffice, or nearly to suffice, for the requirements of a College of Science, in which engineering would be an important but not the only subject of instruction. In addition to engineering, the course of instruction might be adapted to the training of students for the following callings :—

(*a*) (1) Managers and sub-managers of estates ; (2) tehsildars or land stewards.

(*b*) (1) Superintendents and Assistant Superintendents of Survey ; (2) Inspectors of Survey, Canoongoes, and even common field measurers or amins ;

(3) Veterinarians and cow-doctors ;

(4) Accountants ;

(5) Possibly for other callings also.

6. There is at present a large field for employment of competent persons as managers of estates and surveyors, and there is not a sufficient supply available of such persons.

7. I think that the Seebpore College or the proposed new Bengal College of Science and Art might well be utilised for training managers of estates and supervisors of surveys, of whom many will be required in Bengal in future. If the institution can be reorganized on some such basis as has been above suggested, it may be that its continued existence can be justified, but if not, it would appear to me that the college ought to be abolished.

8. The present time is opportune for the proposed change, both because of the general impetus recently given to technical education and the demand for it which has arisen, or may be expected to arise, and also because of the special need in Bengal for trained managers of estates and surveyors, veterinarians and cow-doctors.

9. Much has lately been written on the subject of technical education, but nothing has been done in Bengal, and nothing that is practical has hitherto been suggested. The proposal to turn Seebpore into a general College of Science and Art appears to me to be eminently practical. If the money now spent on a few engineers, and the amount lost on the workshops, together possibly with the amount expended on the School of Art likewise, are all thrown into one common fund, it ought, without any additional expense to Government, to be possible to establish, either at Seebpore or in the buildings lately occupied by the King of Oudh and Seebpore combined, a Central College of Science and Art worthy of the capital of India, and on some such scale as was recommended in a note on technical education prepared by order of His Excellency the Viceroy in the Home Department of the Government of India, and described in paragraph 87 of that note—

"Industrial Schools must be linked to a Central Institution which should be the highest embodiment of instruction in the particular art or industry with which the school is concerned. This Central Institution, be it the Presidency School of Art or the Engineering College, must not only direct and control the teachings of the schools scattered throughout the province, but inspire them with new ideas and furnish them with good designs.

"Even at the risk of repetition and prolixity, the present writer would most strongly urge the view, which is, indeed, confirmed by the experience we have had upon this question, that no system of Industrial Schools can possibly work in India which does not proceed upon the principle that all Technical Schools of a particular class shall depend on, and be subordinate to, a Central Institution.

No Industrial School should be established except with the concurrence of the Director of Public Instruction and of the Principal of the Central Institution. These officers should decide whether, in a particular locality, an Industrial School is wanted, and they should prescribe its curriculum when the school is established. The Central Institution, whether we call it a School of Art or a Science and Art Department, should gather up in itself all that is best in the Art and Industrial traditions and workmanship of the province, and it should be enabled to attach to itself by stipends and scholarships all promising pupils, some of whom would doubtless adopt the profession of a teacher. The Central Institution should decide, in communication with Local Boards, District officers, and Directors of Agriculture and Commerce, when a particular industry in a particular place needed encouragement and training; and the expense of the school then established might reasonably be in whole or part a charge on local funds. This scheme will, if approved, work in with the system of Economic and Industrial Museums, which has recently been engaging the attentions of the Government of India, and, among Local Governments, more especially of the Government of Bengal."

10. If some Central Institution like that sketched out above be established—and there would appear to be no difficulty, financial or other, in establishing it—industrial and survey schools, of which there are eight now in existence in Bengal, but are isolated and out of connection with the general system of education, might be affiliated to the Central Institution. Other schools of the same kind may be established, and the system of *bifurcation* of studies, recommended in pages 219—222 of the Education Commission's Report, and strongly supported by the Government of India in their Resolution, dated October 1884, might be gradually carried into effect.

11. The scheme sketched out above may possibly be too large a scheme to permit of its being carried out solely on the recommendation of the present Committee; but the Committee may, I should hope, recommend it to Government for favourable consideration, and a Sub-Committee may work out the details as far as this may be possible.

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## *(c) Further note on the reorganization of Seebpore College by Mr. Finucane.*

The Committee having received favourably the idea of reorganizing the Seebpore College, and asked me to furnish an estimate of the cost of the extra establishment which would be required in order to carry into effect the suggestions made in that note, I propose to sketch in outline the course of instruction to be prescribed, and the extra staff that will be required for the purpose indicated and the cost thereof.

*I (1).—Course of study for Managers and Sub-Managers of Estates.*

A.—Agriculture, Horticulture, and Arboriculture.

B.—Chemistry.

C.—Physics.

D.—Botany.

E.—Physiography, Geology, and Meteorology.

F.—Physiology, Entomology, and Laws of cattle-breeding.

G.—Book-keeping and zemindary accounts.

H.—Surveying, Levelling and drawing. (The instructions in these subjects will be of an elementary nature.)

The theoretical instruction will be followed by practical work in the *field and laboratory*.

*I (2).—Course of study for Tehsildars and Land Stewards.*

The subjects of study for this class will be the same as those for I (1), but the instruction, especially in B, C, D, E and F, will be of a more elementary nature. The students will be required to learn the operations of the farm practically.

The area of estates under direct management of the Government of Bengal (Khas Mehals and Wards) is about 24,000 square miles, nearly equal in extent to half of all England. These estates are now managed by an untrained agency consisting of Deputy Collectors, office amlas, and others, who are selected, not because of any special aptitude or training for the work, but because of their general respectability or for their smartness at litigation. It ought to be possible to provide employment in these estates for a large number of students when they have gone through the proposed course. They might at first be employed as apprentices and on small pay, and afterwards, when they have acquired practical experience, as sub-managers and managers of Government and Wards' estates.

Openings for their employment under private zemindars may also be expected.

*II (1).—Course of study for Superintendents and Assistant Superintendents of Survey.*

A.—, B.—, C.—, D.—, E.—, G.— } Of the course fixed for class I (1).

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H.—A full course of Surveying, Levelling, and Drawing.
I.—Mathematics.

*II (2).—Course for Inspector of Surveys, Canoongoes, etc.*

A.—Elements of Agriculture.
B.—Surveying, Levelling, and Drawing.
C.—Zemindary accounts.
D.—Mathematics.

The instruction in all these branches will be of an elementary nature, but sound and practical as far as they go.

The area of Government and Wards' estates which *must* be surveyed during the next twenty years in Bengal is very great. There are at present no Bengali surveyors of the higher grades and very few properly trained inspectors or amins of the lower grades. The Survey Department is, I believe, entirely manned by Europeans in the higher grades, and chiefly by natives of the North-Western Provinces and Punjab in the lower grades. I think Bengalis well suited for survey work, and see no reason why the Survey Department should not be asked to recruit to a considerable extent from the future passed students of Seebpore. But if that department does not recruit from Seebpore, the Local Government can itself offer employment to a large number of competent surveyors of Bengal and Behar, in the survey of its own and of Wards' estates and of private zemindars' estates.

*III (1).—Course of study for the Veterinary class.*

A.—Anatomy, Surgery, and Physiology.
B.—Pathology and Medicine.
C.—Chemistry (elementary).
D.—Sanitation.
E.—Laws of cattle-breeding.

The theoretical instruction will be followed by practical work in the dissection room and the hospital.

*III (2).—Course of study for Cow-doctors.*

This course will include all the subjects fixed for class III (1) excepting Chemistry, but the instruction will be of a very elementary nature and conveyed in the vernacular.

(1) Kumar Baikuntha Nath Dey of Balasore will pay entire cost of education and provide employment for one pupil . . . 1
(2) Pooree Municipality will pay part of cost of employing passed student . . . . . . . . . 1
(3) Babu Run Bahadoor of Gaya will guarantee employment to one student . . . . . . . . . 1
(4) Messrs. Mylne and Tompson of Beheea will pay for education of two students and guarantee employment . . . 2
(5) Maharajah of Doomraon guarantees employment to one passed student . . . . . . . . . 1
(6) Maharajah of Hutwa guarantees employment to one student . . . . . . . . . 1
(7) Lala Bun Behary Kapur, Manager, Burdwan Raj, will send to the school and pay for two students to be selected by himself and will found one scholarship at Rs. 5 a month . . 2
Babu Lolit Mohan Roy of Chakdighee proposes to send to the school and pay for two students of his own selection, and to found a scholarship of Rs. 5 . . . . . . 2
Two zemindars of Midnapore propose to found studentships, number not stated.

The question of establishing a veterinary school for Bengal has already been under consideration of the Bengal Government, and all the details were worked out in a scheme submitted by me in April 1886. In connection with that scheme, the private gentlemen and public bodies noted in the margin offered to send students or to furnish scholarship, of the value mentioned opposite their names, and more would doubtless be willing to do so if asked.

The Government of India has lately again mooted the question of establishing a Veterinary School in Bengal, and the present appears to be a suitable opportunity to reconsider it.

*IV.—Extra Establishment and cost thereof.*

The following is an estimate of the cost of giving effect to the proposals made above:—

| Teaching Staff and Establishment. | Monthly salary and cost. | | Remarks. |
|---|---|---|---|
| I. | Rs. | Rs. | |
| (1) Lecturer in Agriculture and Agricultural Chemistry. | 333 rising to | 1,000 | This officer should be a native graduate of Cirencester, and should be graded in the upper educational service. His appointment would be an extra one. |
| (2) Assistant Chemical Analyst . . . . . | 200 | | |
| (3) Lecturer in Botany . . . . . . | 150 | | |
| (4) Chemical Laboratory . . . . . | 60 | | |
| (5) Botanic " . . . . . . | 35 | | |
| II | | | |
| *For Veterinary School.* | | | |
| (1) Superintendent of Veterinary Department Professor of Veterinary Anatomy and Surgery. | 600 to | 1,000 | By annual increments of Rs. 50. |
| (2) Assistant to Professor and Lecturer of Anatomy and Surgery, to assist the Professor. | 200 to | 250 | Ditto ditto Rs. 10. |
| (3) Lecturer on Anatomy and Physiology . . | 50 | | |
| (4) Lecturer on Materia Medica . . . | 50 | | |
| (5) Working establishment of Veterinary School . | 150 | | |
| (6) Keep of 50 head of cattle at Rs. 6 per month . | 300 | | |
| Total . . | 2,128 | | Rs. 25,536 per annum. |

*Scholarships and Stipends.*

Half the scholarships and stipends now devoted to engineering might be diverted to the Agriculture and Veterinary classes. This would give—

One scholarship of Rs. 20 a month.
Three scholarships of „ 15 „
Sixteen „ of „ 10 „
Five „ of „ 6 „

One graduate scholarship of Rs. 100 and three of Rs. 50 each. To these must be added the scholarships and studentships that were offered for the Veterinary class and mentioned in the margin of III (2).

Other studentships and scholarships will doubtless be founded by private individuals.

These must be considered fairly sufficient for the proposed classes, so that no additional expense will be incurred under this head.

For buildings a capital outlay may be required for—

| | | Rs. | |
|---|---|---|---|
| Hospital | | 6,000 | The amount may be easily provided from the Jubilee Fund. |
| Hospital for infectious disease | | 1,000 | |
| Dissecting room | | 3,000 | |
| | Total | 10,000 | |
| Fittings for above | | 2,500 | |
| | Total | 12,500 | |
| A building for the Chemical Laboratory | | 5,000 | |
| Chemical apparatus, etc. | | 5,000 | |
| Botanical Laboratory | | 1,500 | |
| | Total | 11,500 | |
| GRAND TOTAL OF CAPITAL OUTLAY | | 24,000 | |

The total annual outlay would not be nearly equal to the savings which might be effected by reducing the present cost of the workshops, and the funds for additional buildings which are not large might be met from the Jubilee fund. Additional scholarships might also be established from the proceeds of that fund.

*Statement showing the Number and Salaries of Managers of Wards', attached and Encumbered Estates in the Lower Provinces.*

| Number of Managers. | Net salary drawn by each Manager. | | | Remarks. |
|---|---|---|---|---|
| | Rs. | A. | P. | |
| 1 | 1,000 | 0 | 0 | |
| 1 | 857 | 2 | 5 | |
| 1 | 700 | 0 | 0 | This is the maximum salary of the Tikari Manager. The minimum salary is Rs. 500 ; it rises to Rs. 700 in five years. |
| 3 | 600 | 0 | 0 | |
| 1 | 500 | 0 | 0 | |
| 5 | 400 | 0 | 0 | |
| 1 | 318 | 2 | 11 | |
| 3 | 300 | 0 | 0 | |
| 4 | 250 | 0 | 0 | |
| 1 | 214 | 4 | 5 | |
| 2 | 200 | 0 | 0 | |
| 5 | 150 | 0 | 0 | The Manager of the Courjon Estate also gets commission at 2½ per cent. on collections of the estates of Bhubunjore Shaha and Gunga Charan Mozoomder. |
| 2 | 125 | 0 | 0 | |
| 1 | 120 | 0 | 0 | |
| 2 | 100 | 0 | 0 | |
| 1 | 75 | 0 | 0 | |
| 1 | 68 | 2 | 10 | Besides commission at 5 per cent. on collection exceeding 50 per cent. of the total current demand. |
| 1 | 60 | 0 | 0 | Ditto Ditto Ditto. |
| 1 | 50 | 0 | 0 | |
| 1 | 42 | 14 | 5 | |
| 1 | 42 | 13 | 9 | |
| 1 | 35 | 0 | 0 | |
| 2 | 30 | 0 | 0 | |
| 1 | 15 | 0 | 0 | |
| 43 | | | | |

## (d) Note on Manual Training by Mr. J. S. Slater.

I wish to add this note to the report of the Committee, in order to explain to what extent I agree to the proposal for the abolition of the Seebpore Workshops.

I am not an advocate for the continuance of the system of theoretical and practical instruction proceeding *pari passu* in the case of students in the Engineer Department of the College; but as regards the Apprentice Department, the present system, with all its defects, has helped to satisfy a want in the country, and I should be sorry to see it abolished without adequate provision being made for the supply of the same class of trained labour. The recommendation of the Committee provides for the practical training of apprentices in Railway or other Workshops if the present shops are abolished ; and if this training could be placed on a sound basis, so that each yearly

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batch of men could feel sure that their practical training would be carried on by men anxious to help them and desirous of seeing them turn out useful mechanics, the recommendation would have my unqualified support. But it is here that I am doubtful of the value of the change. On the abolition of all practical training during the College course, the apprentices when leaving the College for outside workshops would be utterly ignorant of the tools, etc., which they would have to handle, they would be looked upon as expensive adjuncts in the institutions to which they might be relegated. Instead of being a means of saving money, both time and money would have to be expended on them before they could be considered of the least use, so that they would be likely to receive but scant welcome at the outset of their practical career. Their advent would be looked upon by the authorities of the various shops to which it might be decided to send them with anything but favour, and only in very exceptional cases would they be likely to derive any benefit from a training that would be grudgingly given. In some few cases the system might work fairly well, but in the majority of cases failure would have to be looked forward to.

As regards the practical training which the apprentices have hitherto received in the Seebpore Workshops, I cannot speak of it in unqualified terms of praise; but I am quite convinced that a distinct advance in technical instruction has been made since the establishment of the present system of training the apprentices, notwithstanding that in the past eight years, during which the system has been in vogue, many causes have been in operation tending to depreciate the value of the system. In the first place, there have been many changes in the workshop staff; again, the systems of instruction, advocated by successive Superintendents, have lacked that continuity which lies at the basis of true progress; and further, the Public Works Department has not placed such reliance on its own workshops as would help to make it a school in which varied and useful work could be learned. The first two of the above drawbacks could be easily remedied if any real desire were shown to foster the spread of technical education in Bengal, but it would be more difficult to overcome the third cause of the depreciated value of the workshop training unless the present regulations in force with reference to the supply of work to the Public Works Department were modified. It is this difficulty which leads me to the belief that if the shops are to be continued at all, they must be continued on a different system to that at present in force, and I would advocate their being placed under the Educational Department. This transfer would be accompanied by certain advantages, such as continuity of methods of instruction, and a freer system of work; for if the shops were once definitely regarded as merely a training ground for skilled labour, any competition in such a College on the part of Government with private firms would not be looked upon as an encroachment on fields of private enterprise. These advantages would be doubtless somewhat counterbalanced by a large withdrawal of work by the Public Works Department, but a system might be inaugurated by which some of the more valuable kinds of instructive work, such as repairs to engines and the like, might still be continued to be sent to the shops. If in addition to this the Public Works Department would adopt a few standard patterns for the various orders which are now sent out, and if the promoters of technical training in India were authorized to employ the apprentices under their charge to manufacture these articles, the instruction of the apprentices might be carried out at a small outlay to the State, and with direct advantage to the employers of skilled labour in the country.

Before concluding this note, I may mention that, notwithstanding its defects, the system of instruction in the Seebpore Workshops has advanced to such a stage that the students and apprentices look upon manual labour as part of their daily routine; their proficiency in the different departments of the shops is yearly tested by a rigid practical examination, which is on the same footing as the theoretical examination; any student failing in the practical examination being debarred from passing, however well qualified he may be in the theory of his profession. If the present system has done nothing else, it has familiarised the students with the use of various tools and machines, and has raised the natives in the College from being merely memory bags into *quasi*-sentient workers. Progress in this direction among an indolent race like the Bengalis must perforce be slow, but an enquiry into the records of the college will show that distinct progress has been made since the introduction of manual instruction; and I fear that if the present regulations are altered on the lines proposed by the Committee without adequate precautions being taken to ensure even the continuance of the present method of practical instruction, the result will be a return to the old system of books first, thought, dexterity and originality nowhere.

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## *(e) Second note on the Seebpore College course of training by Mr. F. J. Spring.*

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As regards the general question of the utmost utilization of the resources of the College for the needs of the country, apart from that of the relationship of the College to the University through the medium of its small engineer class, I am glad to have this opportunity of placing on record the following remarks; and if through the Education Department, or through the University, they reach the Lieutenant-Governor, and bear the fruit which it is my wish that they should bear, I shall not have regretted the very considerable expenditure of trouble, reading, and leisure which my connection with the College and the University have recently involved.

It is in my opinion the highest folly that a great Province like Bengal should have spent lakhs of capital and should go on incurring heavy annual expenditure on an institution which fails to thoroughly accomplish the object for which it was founded, such failure being in great part ascribable to the want of a small and judicious further expenditure upon the essential requirements of modern technical teaching. If red-tape and inter-departmental routine stand in the way, they

should be made to give way. If in a fit of zeal for the benefit of the College I endeavour to procure a few models and teaching apparatus which I know to be lying idle elsewhere, I am met by the difficulty of being obliged to move through a maze of routine correspondence with sundry departments, who are little interested in, and know even less of, the College. Were I free from such trammels, I could get valuable aid from the State Railway Department, the Mathematical Instrument Department, the Survey of India, the Telegraph Department, and the Calcutta School of Art. The judicious expenditure of the comparatively small sum of five to ten thousand rupees in apparatus, models, laboratory and other appliances would greatly enhance the available teaching power, and ensure that much of the expenditure which is now being incurred was not fruitlessly thrown away.

One of the chief difficulties with which the College has had to contend in the past is that it has been nobody's child. While its business is to train up officers and subordinates for the Public Works Department, and to educate engineers and foremen for general employment, it has, so far as its teaching goes, been under the Educational Department, which, except in this instance, has had little or no experience in technical teaching. The result has, I fear, been that Seebpore has received but scant attention from that Department which looks on it as connected with a class of work which (except in the small number of cases of Engineering students) does not tend towards University honours, and which is consequently beneath its notice. In the Public Works Department the College is but comparatively little known beyond the narrow circle of the Bengal Provincial establishment. I know as a fact that but few of the largest class of employers of such labour—Engineers-in-Chief and Managers of Railways—are even aware of its existence. Then, again, the University knows only of the College as sending up one or two men annually at the far end of the very long degree list, and are probably quite unaware of the fact that it is capable of a large amount of useful work with which the University is in no way concerned. Then there is the serious difficulty that while as regards their book work the students are under the Educational Department, they are as regards their manual work under the Public Works Department. There is a want of unity about all the arrangements for the studies at the College; and that this should be so is due, not to the matter not having been carefully thought out by the Professors and others who are most competent to settle things upon a proper basis, but to matters having been originally arranged as they are with the idea that such disposition was the best that could be devised, and to its being nobody's business subsequently to point out to Government that the plan is not working as harmoniously as was anticipated.

The Committee which is now about to sit may be relied on to go thoroughly into all questions affecting the success and well-being of the College, and Government cannot do better than carry out their recommendations so far as the financial position may permit, if it is their desire that the resources and teaching power at their disposal should be fully utilised. A very serious obstacle to the success of the College in the matter of attracting students of the Engineering class is, that if a man fails to gain the University degree at the end of his course, he has absolutely nothing to show that he has gone through four years of special and careful training. It ought certainly to be in the power of the College authorities to give certificates of so many years of study to such students to assist them in obtaining employment. A man who has had four years of such training, even though he may have subsequently failed for the degree, is undoubtedly, for any technical employment, a far more useful man than the average B.A. or M.A. man. He has for four years been intimately concerned with *things* and not with mere *words*. He has shaken off the trammels of Bengalee thought in such matters as the indignity of honest manual work. He is, or ought to be, a fair mathematician, having passed the F.E. test. He is probably a good draughtsman. He knows a good deal about physics, and the meaning of the ordinary phenomena of nature. And yet he has nothing to show for all this.

The principal ought to be permitted to give a certificate of having gone through the course to all students who, though they may have failed to qualify for the degree, have yet satisfied him, by examination or otherwise, that they have fairly profited by their four years' special training.

There are many other matters which I might enlarge upon here, but they will, I hope, be authoritatively dealt with by the Committee. What I desire now to lay stress upon is that to buy a three hundred guinea hunter, and then economise by giving him mouldy hay and stinting him in oats is sheer stupidity, and that is precisely what has heretofore been done with Seebpore College. It ought to get a liberal capital grant at once, and an increased annual grant for proper modern practical technical teaching. The notion that technical work can be taught by means of books alone has long since been exploded, and the sooner this is recognised in Bengal, the better it will be for the material advancement of the province.

*The 24th July 1887.*

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## *(f) Second note by Mr. Slater on workshop training at the Seebpore workshops.*

1. In a former note I have advocated the retention of practical training in the Seebpore Workshops for the Apprentice Department of the College, as I consider that any attempt to introduce a system for the practical training of our apprentices in railway or other workshops is not likely to be successful. The question with reference to the Seebpore Workshops is shortly this:—(*i*) the Public Works Department is anxious to abolish them on economic grounds; (*ii*) the practical training of the apprentices must be continued, as this class of skilled labour is required for the country; and (*iii*) other workshops, unconnected with the College, are not likely to give the class of training required for the apprentices. The only course open, then, is to place the workshops

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under the Educational Department, to be worked exclusively as educational shops. If this transfer is made, the shops must be organized on quite a different system to that hitherto in force. As soon as the transfer is made, a certain number of the machines and a great portion of the engine power could be dispensed with. They could either be sold or transferred to different Public Works Department divisions for employment on remunerative works. This reduction in the machinery, etc., might be made by a Committee appointed to look into the matter. With regard to the rest of the machinery, I would advocate its being kept on in order that patterns might be made from it, and similar machines manufactured and erected in the shops. Year by year new machines should be made until the shops are properly equipped with a sufficient number, so that all the apprentices may have an opportunity of learning how to work them practically and with expedition. It is, I believe, a generally expressed opinion that it is impossible to do the class of work proposed in this country. What the foundation of the belief may be, I do not know, but it seems to me that if the necessary tools and material are available, and the work is under the supervision and control of competent men, there should be no difficulty in overcoming the too generally expressed opinion that no good thing can be made in India. In a shop devoted entirely to the instruction of youths, with the further object of the general spread of technical industries in India, it would be premature to expect it to be self-supporting at the beginning. No doubt considerable difficulty will be experienced at first in the practical working of the shops on the lines indicated, and in some cases failure would undoubtedly occur; but the failure would not be complete, as quite as much, if not more, instruction can be imparted in demonstrating the causes that lead to failure as those that bring success. The class of training which I propose, as far as I am aware, is not carried on at all in India. Any Engineer would concede that it is an admirable system for imparting instruction, and I consider that the time has come when the opportunity of introducing it should be taken advantage of. If it does prove unsuccessful, it will not have been time thrown away, as the instruction of the students will not have suffered; and if successful, it would open out a new industry in India, which must sooner or later be introduced to keep pace with the daily increasing requirements of the country. Further, if the system does prove successful, the shops will be supplied with machines far below the market rates, and will by the help of these machines be in a position to do all the more work, and so tend to become remunerative.

As soon as the shops have become properly stocked with machines, I would extend the sphere of instruction given above, and begin to manufacture other articles, such as steam-launches, portable engines, stationary engines, and the like. I would further advocate the manufacture of articles of general use to be kept in stock and sold to Government or to private firms. I would also open out a girder shop for the manufacture of small girders for State Railways. These could with no difficulty be manufactured according to the standard designs of the State Railways, and if Government could be induced to foster the spread of technical education so far as to accept at cost price the articles of this nature that could be produced, the success of the shops as a training school would be ensured. I am quite aware that questions of imperial policy are involved in this suggestion and that an outcry might be raised against it on the ground that private enterprise was being interfered with at the expense of the tax-payer, but I do not think that any serious objections could be raised. I have already stated that the sole labour to be employed in the shops will be the students of the College. Their numbers will not be great, and their hours of labour will be small, owing to the fact that their theoretical instruction will proceed side by side with their practical training. The amount of work, therefore, that would be turned out would perforce be small, and would form an almost infinitesimal proportion of the commercial value of this class of work now required for the country. On the other hand, by the introduction of the system I advocate, we should be able to turn out cheap and efficient mechanics by whose agency the very firms interested in this branch of trade would be benefited, as, if a large supply of this class of indigenous skilled labour were ensured, the market value of the labour would necessarily decline.

I need not go into any further detail with reference to the class of work I would introduce by degrees into the shops. What has already been suggested would give the students a very fair acquaintance with the ordinary work in the fitting, foundry and blacksmiths' shops. In addition to this, I would impart a practical knowledge of carpentry, so that the students might be capable of assuming the duties of foremen in any department of a workshop.

2. Workshops such as these would be, if entirely under the Educational Department, might be looked upon by the profession as partaking more of the nature of an amateur institution than of one whose outturn was to be looked upon as reliable, and it might take some years to disabuse the public mind in this respect unless a special testing department were added to the shops. I would therefore suggest that the shops be properly equipped with the ordinary testing machines. Most of these could be made in the shops under the supervision of the Superintendent, and would supply a great want which at present exists in India. There is no properly equipped engineering laboratory in Bengal, or, as far as I am aware, in India. It is true that in some workshops materials can be subjected to simple tests for strength, but there is no means of ascertaining the quality of materials now sent out to India. A college like this should be in a position to make up for this want, and it would be quite possible to introduce all the requisite testing machines at a moderate cost, as most of them are sufficiently simple to enable their being made in the shops. The more difficult part of this class of work would naturally fall to the Foremen and Instructors, but the bulk of the work could be done by the students.

3. In the above remarks I have been dealing more especially with the training of Foremen mechanics in the proposed engineering shops. I may add that the Engineer class students could be also employed in the shops with great advantage under the proposed method of instruction after the completion of their theoretical course.

4. With regard to the proposal to establish an Agricultural class in connection with the College I think that an efficient practical education might be imparted to these students in an educational workshop. To effect this the shops should be equipped with the various machines at present employed in the development of agriculture. The agricultural students should be instructed in the various methods of making ploughs and other agricultural implements. They should also be able

to erect the plant for sugar mills, and be able to work and erect the simple classes of machines for the extraction of fibres. In an educational workshop of the class proposed, it would be quite possible to erect samples of all this class of machinery at a nominal cost, and the shops should in fact be the centre at which all new inventions for improvements in agriculture should undergo a practical trial. These trials, by the successes and failures which must naturally result, would be an excellent training for agricultural students, and the experience they would gain would help them greatly in the practical working of their profession.

5. One of the main reasons I have in advocating the establishment of an educational workshop in distinction to a Public Works Department workshop, is that in the one case useful experimental work can be carried out, whereas in the other, however useful the work may be, it cannot be carried out unless it is to supply a particular want of the Public Works Department. As the shops are at present constituted, no work can be done except for Government; and for many years past, in fact since the establishment of the shops, the orders that have been received have not been sufficient to make the shops pay. Several causes have been at work to prevent the shops being worked at a profit, such as continual changes of establishment, inadequate machinery in some shops, with excessive appliances in others; and last, but not least, a general feeling among the members of the Public Works Department that it would be more satisfactory to employ private firms to do work for them than a Government institution, as private firms have less circumlocution than a Government office, and are therefore likely to be more expeditious in turning out work. However this may be, it is an undoubted fact that, where possible, Public Works Department Engineers prefer to give their orders to private firms, and the result of this preference is manifested in the desire of that Department to get rid of a shop which does not earn the confidence of its officers, and which has been uniformly worked at a loss under the system upon which it was decided to carry it on. If these shops were transferred to the Educational Department, they would start on quite a different basis. The tools and plant would be provided, and such strict analysis of the accounts on a remunerative basis would not be required; the chief condition of importance attaching being the outturn of sound practical men, who could conduct economic enterprise in the country at a reduced cost: men who had received such a training as would enable investors of capital to employ them either for the promotion of new industries or for the extension of those already established in the country.

6. I have already given my views regarding the proposed working of the shops as affects ordinary mechanical work. If the shops were organised on the general basis already advocated, it would be possible to gradually extend them so as to embrace new enterprises as well as those already working in the country. By a moderate outlay special instruction could be imparted in the various branches of spinning industries already established in India. Sample plant could with no difficulty be erected and a course of training instituted to qualify students for employment in the various mills in and around Calcutta. New industries could be economically started, as the site is large enough for great extension in industrial enterprise. Under efficient and skilled mechanical supervision, the practical instruction might be so extended as to embrace the more paying indigenous industries, and by gradually bringing the various primitive methods of manufacture under central scientific control, great economic results would follow. In my opinion the general spread of technical education can only proceed from the establishment of some central supervising institution, to which the more promising pupils of local crafts could be sent, where their more extended education could be conducted. I will not dilate on this point, as this is a subject of such importance as to require a special note to show how the working of it can be practically carried out in India.

7. In order that the system I have advocated should work well, it will be essential to hold out inducements to both the foremen and the apprentices to work with zeal and energy. With the information now available, it is not possible to estimate the commercial value of the labour of the apprentices: this is much to be regretted, as without these figures no reliable estimate can be framed of their value as workmen. The apprentices, it is true, have worked daily in the shops during the College terms, but owing to a want of continuity in the method of instruction, and to the paucity of instructive work and machinery in the shops, the apprentices have had no inducements held out to render themselves remunerative workers. The foremen and instructors also have had no encouragement offered to them to do more than will pass muster in the way of helping the apprentices. Their time has been for the most part occupied in the ordinary work of the different branches of the shops under them, and it is quite natural that they should give but scant attention to work which they might consider beyond their sphere. Under this state of affairs it is hardly to be wondered at that the practical instruction of the apprentices has scarcely attained to such a state of perfection as was originally expected would follow when the College was placed in close proximity to the shops, and practical training was included in the ordinary curriculum. To give more life and energy to practical work, I would therefore urge most strongly that substantial inducements be offered to foremen, instructors and apprentices to work to the best of their ability. These inducements should take the form of money payments for work performed. The foremen and instructors should get a percentage of the value of the work turned out, and the apprentices should also receive a fair allowance. The exact amount of this remuneration may be decided upon hereafter, but as a tentative measure I would recommend that the following procedure be adopted:—

Estimates for all work undertaken in the shops should be prepared based on the ruling local rates. On sanction being received that the work may be put in hand, correct accounts should be kept of the materials used. A fair valuation, fixed preferably on the cost of engine and other charges, should be made, and the amount added to the value of the materials used. The total of these two items, *viz.*, value of materials and percentage on engine charges, should be deducted from the original estimated value of the work. Out of the balance 10 per cent. might be awarded to the foremen and instructors in proportions to be decided upon hereafter, and 40 per cent. to the apprentices; the remainder being placed to the credit of Government as a set off against the cost of instruction and the interest of capital invested.

As regards the value of the labour of the apprentices, I would suggest that the following plan be adopted. All apprentices should be divided, as far as workshop training is

concerned, into two distinct classes—(*i*) remunerative and (*ii*) unremunerative. The duties of apprentices in the unremunerative class will be to afford general help to the remunerative apprentices. Facilities should be given to them to learn the practical working of the various machines, but their services should not be required in any way until they were able to prove to the satisfaction of the superintendent of the shops that they were reliable working hands. This rule would create a desire among the junior apprentices to learn their work, and a direct stimulus would be given to them to become of some economic value. The method of ascertaining this qualification can be fixed upon at some future date when the system is in working order. The apprentices again in the remunerative class should be sub-divided, but without practical working of the system advocated, it is not possible to lay down the exact lines on which the sub-division could be carried out. The main principle, however, to follow would be to attach different values of payment for apprentices in different classes. As regards the payment of earnings to the apprentices, I would recommend that all earnings should be placed to their credit in the Savings' Banks, and given to them when leaving the college or on the completion of the full course. I would make a further condition in respect to this payment, and that is, that all earnings will be forfeited in cases of misconduct, a term which should be understood to include idleness.

Owing to the class-work of the apprentices proceeding at the same time as their practical work, and also owing to the fact that a fair number of the remunerative apprentices will have completed their theoretical work, it will be necessary to give the remunerative apprentices some aid in the performance of their practical duties. This I would propose to do by establishing an artizan class, and this class could be formed as follows:—A certain number of lads, the sons of common workmen, should be admitted to the shops. On first joining they should receive a small monthly allowance of, say, Re. 1 or Rs. 2 a month. Their duties would be to help the remunerative apprentices in their work, and their labour should be carefully superintended. Laziness or absence from work should entail instant dismissal and forfeiture of stipends. For the present the number might be fixed at 30, but this number might be increased or diminished according to circumstances. The stipend should be raised as the artizans increased in proficiency up to, say, Rs. 3 a month. In addition to the practical work this class would learn, I would inaugurate a simple system of education for them, which should consist of instruction in drawing and simple practical geometry and mensuration. This would entail the appointment of an additional instructor, unless one of the practical instructors was sufficiently trained for this work, and at no very distant date it would be possible to procure a native who would be able to combine the qualifications of practical instructor and artizan trainer.

8. The cost of maintaining the shops on the above lines, not including its extension as a general centre for technical work, will be somewhat as follows:—

| | Rs. |
|---|---|
| A Superintendent on Rs. 500 | 500 |
| Two Foremen on Rs. 200 each | 400 |
| Four Instructors on Rs. 30 each | 120 |
| Engine and workshop expenses | 200 |
| Petty establishment | 80 |
| Stipends to artizans | 80 |
| Store-keeper and clerk | 70 |
| Total monthly cost | 1,450 |

In addition to this, about Rs. 5,000 a year should be sanctioned for materials to be manufactured. The total annual cost would be, taking the salaries at 12 months and the petty establishment and engine charges at 10 months in the year, Rs. 21,840, including materials. It is quite impossible to say what value of work could be performed by the apprentices until the system has had a fair trial, but if the number of remunerative apprentices is sufficient to manufacture 5,000 rupees' worth of raw material into machines, the value of the manufactured article would be at least six or eight times the value of the raw material. This would represent machines of the value of Rs. 30,000 or Rs. 40,000 a year. Taking the smaller figure, and deducting the cost of materials, the balance will be Rs. 25,000. If the engine charges are valued at 15 per cent. of the total value of the work turned out, we get 15 per cent. on Rs. 30,000, Rs. 4,500. If this be subtracted from Rs. 25,000, the balance is Rs. 20,500. If half of this again is divided among the foremen, instructors and apprentices, the total cost would be as follows:—

| | Rs. |
|---|---|
| Establishment, working charges and materials | 21,840 |
| Remuneration to foremen, etc. | 10,250 |
| TOTAL | 32,090 |

On the other side of the sheet there would be 30,000 rupees' worth of machines added to the stock of the shops, either to be kept for instructive purposes or to be used by the Public Works Department on remunerative works. These figures show an annual loss of Rs. 2,090. The present annual loss is estimated at about Rs. 27,000, and this loss does not include a further indirect loss, which, it is stated, is incurred by employing the shops in preference to getting work done by private firms. The figures given are to a great extent conjectural, but they are the nearest approach that can be made in the present state of affairs. They do not overestimate the profits that are likely to accrue, and I consider that if the Government of Bengal can train this class of labour in India at the estimated annual outlay of Rs. 2,090, it will be money well spent.

# (g) Letter from the Government of India on the proposed abolition of the Seebpore Workshops.

No. 4. Seebpore College enquiry, 1889.

No. 312, dated 13th July 1889.

From—A. P. MACDONNELL, Esq., C.S.I., Secretary to the Government of India, Home Department,

To—The Secretary to the Government of Bengal, General Department.

I am directed to acknowledge the receipt of your letter No. 12-T. G., dated the 3rd ultimo, submitting, with reference to the enquiry made in Home Department letter No. 14-459, dated the 2nd November 1888, copy of a report by the Committee appointed by the Government of Bengal to enquire into the method of instruction of the Seebpore Engineering College, together with that of the proposed Government Resolution thereon.

2. The papers submitted raise two questions, namely, (*a*) the conduct of the industrial survey suggested by the Government of India, and (*b*) the proposed abolition of the Seebpore Workshops. As to the first question, I am to observe that the Government of Bengal appears, from the final sentence of paragraph 4 of your letter under acknowledgment, to have to some extent misapprehended the object of the Government of India as expressed in Home Department Resolution No. 199, dated the 18th June 1888. In the Resolution a distinction was drawn between two grades of technical education, namely, the "preliminary" technical education and the "special" or "technical education proper." The former was recognized as a branch of general education calculated to correct the bias of native youths towards a purely literary course of training as well as to prepare them for the special training of practical technical schools. The latter was described as having a direct local connexion with centralized industries. In your letter under acknowledgment the Government of Bengal appears to propose to limit the enquiry into the industries of Bengal to those industries in which European mechanics and overseers are now employed. The Governor General in Council thinks it desirable to explain that the Government of India did not contemplate that the industrial survey should be limited in this manner. If the enquiry to be conducted in Bengal is thus restricted, effect will not be given to the intentions of the Government of India, which were to ascertain by local investigation whether any native industries are of sufficient importance and vitality and sufficiently centralized as to be likely to benefit by the establishment of schools of instruction in the theory and better practice of such industries. Therefore, in conveying his approval to the proposed deputation of an officer to conduct the survey of the existing arts and industries in Bengal, I am to express the hope of the Governor General in Council that these remarks will influence the instructions which His Honour the Lieutenant-Governor may give to the officer selected.

3. In regard to the second question, I am to say that His Excellency in Council entirely concurs in the views of the Director of Public Instruction, Sir Alfred Croft, which it is understood also commend themselves to His Honour the Lieutenant-Governor, regarding the impolicy of abolishing the Seebpore Workshops. Everywhere in India the promotion of technical education is now receiving attention, and the desirability of associating theoretical with practical training has been generally recognized.

There exists in the Seebpore Workshops the nucleus of a technical institution the value of which would be seriously affected by disassociating the practical from the theoretical training of the College. The Governor General in Council doubts if any valid inference can be drawn from the state of the attendance rolls unfavourable to the prosecution of the experiment; and he attaches no great weight to the argument that hitherto the school has not been a financial success. He thinks the importance of the interests involved call for perseverance in the undertaking, and he would be glad if, with a view to improving the opportunities for practical instruction afforded by the school, it were arranged that some of the work of the Public Works Department should continue to be undertaken at the Seebpore Workshops, and Local Boards and other bodies were encouraged to patronize the institution in a similar manner. I am to add that the Governor General in Council would further suggest for consideration whether scholarships tenable at the Seebpore College, may not be established by district and municipal boards for the education of youths who might be placed under contract to serve afterwards for a certain period on district works. If, as appeared in the case of the Lady Dufferin Fund, there still be doubts as to the competency of district or municipal boards to establish such scholarships, the law should be so altered as to remove these doubts.

4. The papers submitted with your letter under reply appear to indicate that the present situation of the College and Workshops operates unfavourably to the success of the institution, as the buildings are out of reach of the commercial community of the city; and an opinion has been expressed that if the College and Workshops were removed to the grounds which were till lately occupied by the late ex-King of Oudh on the other side of the river, they would be close to the Government Dockyard and the new Docks, and would, moreover, be in communication with all parts of India by railway. In favour of this change of situation there appear to be strong recommendations; and as the Governor General in Council attaches great importance to the maintenance and expansion of the College as a school of practical as well as theoretical instruction, likely in time to develop into an institution for technical education in its highest sense, he trusts the matter will in due season receive His Honour's considerations.

# MADRAS.

No. 5.
Industrial Arts
in MADRAS,
1885.

## *No. 5.—Reports on Industrial Arts in the Madras Presidency.*

No. 711, dated 3rd December 1888.

From—J. F. PRICE, Esq., Chief Secretary to the Government of Madras,
To—The Secretary to the Government of India, Home Department.

I am directed to acknowledge receipt of Mr. Edgerley's letter, dated the 2nd November 1888, No. 14—457, enquiring what action has been taken in the Madras Presidency towards carrying out the suggestion for an industrial survey which was made in paragraph 25 of the Government of India Resolution No. 199, dated the 18th June last.

G. O., 24th April 1885, No. 463 Revenue.
" 11th August 1886, No. 695 Revenue.
" 29th June 1887, No. 619 Revenue.
" 20th June 1888, No. 441 Revenue.

2. In reply I am to state that no industrial survey has been undertaken in this Presidency; but in the Proceedings of this Government marginally noted will be found reports on the condition of Industrial Art in fifteen districts of this Presidency, submitted by Mr. Havell, Superintendent of the School of Arts, Madras, as the result of tours undertaken by him under the orders of this Government. The general result of those reports is to show that such a survey as this Government understand to be suggested in paragraph 25 of the Resolution of the Government of India above referred to would be infructuous.

3. Should the Government of India, however, consider further action desirable, His Excellency the Governor in Council would be glad to be informed somewhat more precisely what is the nature of the industrial survey contemplated, and by what agency it is proposed to be made, as it would be impossible for this Government at present to undertake any measures involving additional expenditure.

## *(a) Mr. Havell's note on industries in Madras.*

READ—the following letter from E. B. HAVELL, Esq., Superintendent, School of Arts (on special duty), to the Director of Revenue Settlement and Agriculture, dated Madras, 21st February 1885, No. 78, and endorsement thereon by the latter :—

I have the honour, with reference to G. O., Mis. No. 2221, Public Department, 13th October 1884, to submit my report on the arts and industries carried on in the districts of North Arcot, Salem, Tanjore, Trichinopoly and Madura.

General condition.

2. The general condition of these industries is altogether unsatisfactory. Hardly one of them can be said to be really flourishing. Many of them seem to be fast dying out.

Weaving.

3. Dealing with the weaving industry first, as it is by far the most important in respect of the number employed in it, I find that a great variety of textile manufacture is carried on in these districts—silk and cotton cloths, cotton and woollen carpets, silver and gold lace, satin, reed mats, coarse cotton cloths and cumblies.

4. That this industry has suffered very considerably from the competition daily growing stronger and stronger of the cheap cotton and woollen goods which are being poured into the country and that many weavers have been forced to abandon their trade for other pursuits is already a well-known fact, and it will only be necessary to see to what extent it has affected each branch of the industry.

5. The European goods have their great advantage in point of cheapness, and consequently the native manufacturer who supplies the wants of the low caste and poorer classes has suffered most.

White Cloths—for male wear.

6. Two kinds of white cloth for personal wear are produced by the native weaver: first, a plain white cloth with a narrow border of coloured cotton, and sometimes with a broader band woven across each end, which are worn by the low caste poor; and, secondly, superior cloths of fine texture in which the borders are broader and of silk, and generally embroidered with a simple pattern

and the bands at each end either of silk or of silver lace. These cloths, originally intended for Brahmins only, are now indiscriminately worn by the wealthier classes of every caste.

7. The first of these has been almost entirely superseded for general wear by English long cloth, which is cheaper than the native cloth by about one half. Still the manufacture is carried on throughout the districts on a very small scale, for the native cloth is always worn, by those who can afford it, on occasions of ceremony, and by some it is preferred on account of its superior durability and thicker texture.

8. The manufacture of the finer cloths still occupies a very large proportion of the weavers and is extensively carried on in and around about Madura and Salem.

The prosperity of this industry has also been affected to a less extent by the cheapness of European goods, in a similar way, that whereas a well-to-do native would formerly have four or six country cloths in constant wear, many now reserve the more expensive costume for the religious and domestic ceremonies at which a Hindu would expose himself to ridicule if he appeared in other than his traditional dress. But as these cloths are only within the reach of the wealthier classes, it is probable that the spread of Western ideas and mode of dress has had more prejudicial effect on the industry than the mere cheapness of European goods. Both in the fine, but more especially in the inferior cloths, the profits of the weaver seem to be reduced to a very low margin.

*Female Cloths.*

The manufacture of female cloths is carried on on a very extensive scale, and has not declined to such an extent as the other, for though the industry has suffered considerably in the inferior kinds by the competition of English and French cheap printed cotton goods, European manufacturers have not hitherto produced anything which can at all compete with the finer cloths of Tanjore, Kuttálam and Kuranád, and other places. While the more gorgeous beauties of the textile manufactures of the North, such as those of Benares, Surat and Gujerat, have been fully recognised, it is a pity that the more sober, though none the less remarkable, artistic qualities of these fine cloths and their adaptability in many ways to decorative purposes have not been better appreciated.

10. Artistically speaking a decline is only noticeable in the cotton female cloths, most of which have lost their characteristic beauty by the use of European dyed thread. The Madura female cloths, however, are an exception.

11. Before turning to another branch of the industry, I must allude to signs which show that however unsatisfactory may be the present condition, the native manufacture of cloths has nothing to hope for in the future. The great objection among Hindus to European long cloth, apart from its want of durability, is that the coloured and embroidered border of the native cloth is wanting. So, as I have mentioned before, on occasions of ceremony the native cloth is still used. But within the last year or two, cloths have been introduced into the market exactly similar in outward appearance to the common country bordered white cloth, and selling at two-thirds the price or less. Even the finer cloths with silk embroidered borders, which, on account of the combination of silk and cotton being difficult to work by machinery at a cheap rate, have hitherto escaped the competition of cheap and vulgar imitations, are now being closely reproduced with borders of coloured cotton exactly similar in design. Similarly the women's cloths have until recently only had to compete with glaring printed cottons, which, though injuring native trade in cloths for low caste wear, cannot have affected the industry in the finer manufacture. But lately European cloths woven, instead of printed in imitation of some of the Kuttalám and Kuranád patterns, have been brought into the market, selling at prices with which the native manufacture could not possibly compete.

12. Owing to agents of European firms who have been busy lately buying up native cloths as patterns, the weavers, in nearly every place I visited, looked upon my inquiries with great suspicion, and in some cases refused to allow me to see their looms.

13. The effect of this new departure will no doubt tend to greatly hasten the decline in native weaving. In fact it is obvious that in no very short time the whole of the native industry in the low caste or purely cotton cloths must give way, and only a remnant of the finer manufacture in which silk is partly or wholly used will be able to hold its own to any extent against the cheaper, though vastly inferior in every way, European goods.

*Woollen Carpets.*

14. With regard to woollen carpets a great decline is also noticeable.

*Ayyampet.*

Ayyampet, in the Tanjore district, was once an important centre for the manufacture of the woollen mats or small carpets for which the district is famous, and about ten years ago 107 families were employed in the industry. Now twelve families only are engaged in it.

15. The patterns and colours of the carpets now made are not, as far as I could judge from the few examples available, so good as those to be found in old carpets, but this is probably the effect rather than the cause of the decline in prosperity which is owing more to native preference for inferior European manufactures.

16. These carpets do not ever appear to have found much favour in the European market. The patterns and colours which are very bold and striking do not suit the taste of the many, who, in their painful anxiety to eschew anything vulgar or in bad taste, fall back on so-called "æsthetic" muddiness of colour and monotony of pattern.

*Silk Carpets.*

17. The Tanjore district was also once well known for silk carpets of remarkable beauty. This industry seems to have disappeared entirely. At all events, I was not able to discover any workmen engaged in it.

*Wálajánagar.*

18. At Wálajánagar, also an old seat of the industry, there are now only two workmen employed in it. Inferior designs and the use of aniline dyes are the only noticeable features in their productions.

*Vellore Jail.*

19. Probably the proximity of Vellore Jail, which must have once competed strongly with local manufacture, has been the chief cause of the commercial ruin of the Wálajá carpet trade. The restrictions recently placed on jail manufactures, in this case, came too late.

20. In this jail the methods employed and the dyes used are purely native. But the patterns are too miscellaneous and not always good, and the arrangement of colours is altogether wanting in that essential of perfect harmony which is so conspicuous in unsophisticated native manufacture.

*Cotton Carpets.*

21. Cotton carpets are made at Arcot, Wálajánagar (North Arcot district), Ayyampet (Tanjore district) and Ranjangudi (Trichinopoly district); but the industry is declining commercially and artistically. The patterns, in nearly all cases, are good and appropriate, but at Arcot and Wálajá aniline dyes have completely ruined the industry artistically. The Ayyampet carpets are good, and those of Ranjangudi are the best I have seen both in design and colour. It is worth noticing that country cotton is always used in this manufacture.

*Satin.*

22. Satin is manufactured at Ayyampet, Arcot, and Wálajánagar and at Ariyalúr, Trichinopoly district. It is a beautiful industry which has hitherto attracted little notice. The weavers seem to be of northern origin both from type of features and language, the latter a dialect strongly mixed with Gujerati. The material produced at the three first places is worn by Muhammadans for trousers the principal trade being with Hyderabad. The arrangement of colour is very bold and brilliant but always in good taste. The Ariyalúr satin is distinct in style and of remarkable beauty in colour, as well as tasteful in the simple patterns woven generally in stripes across it. The *ravikkai* (Hindi, *choli*) worn by native ladies is made of it.

Only two men are engaged in this industry, which, as far as I am aware, has never been noticed before.

23. A kind similar in style but inferior in colour and execution is produced in the town of Trichinopoly embroidered with patterns in silver lace.

*Reed Mats.*

24. The only branch of weaving which has hitherto escaped European competition is the reed-mat industry carried on chiefly at Shiyáli and Wandiwash. Those made at Shiyáli are the best and are remarkable for their fine designs and good dyes. The Wandiwash mats are familiar to the Madras bazaar. The patterns are also very good, but the common use of aniline dyes has had disastrous effect.

*Cotton spinning.*
*Gold and Silver lace.*

25. There are two branches of industry closely connected with weaving, cotton spinning and the manufacture of gold and silver lace, which have sunk from great importance to complete insignificance. Machine cotton is universally used in the manufacture of all but the coarsest kind of cloth and in cotton carpets; and similarly the gold and silver lace so much used in the manufacture of the finer male and female cloths is almost entirely European, though there are a few native workmen to be found in Madura and Arcot.

*Cotton printing.*

26. The industry of cotton printing is tolerably widely diffused throughout these districts, though it is in a sadly neglected condition. There are two distinct classes of work, the hand-painted or block-painted cloth, used either for personal wear or as bed-covers (palampores) and the hand-painted representations of mythological subjects for adorning the Hindu cars and temples or for wall-hangings on festive occasions. The former are made at Kumbakónam, Nagore, Uraiyur (a suburb of Trichinopoly), Mána Madura, Permagudi, Pámban, Wálajánagar and Arcot; and the latter at Kálahasti, Salem, and Madura. At Kumbakónam and Nagore the cloths are all hand-painted.

The best of them are exceedingly tasteful in design. The trade which is entirely an export one chiefly with Singapore and Penang has diminished enormously during the last twenty years, probably to the extent of 80 per cent. English printed cottons have supplanted the more costly native productions.

27. The cloths and handkerchiefs of Permagudi, Mána Madura and Pámban are also hand-painted, but quite distinct in style from the last.

Their fine lace-like patterns when drawn or painted by hand with the first preparation of wax, with great dexterity and facility, are exceedingly effective. But owing to the fineness of the patterns they become almost indistinguishable after the cloth receives its deep red and blue dyes. However, there is one man working at Mána Madura whose designs are generally bolder and more suitable for the process.

*Uraiyur.*

28. At Uraiyur some good block-printed palampores are produced by some half-dozen families but the industry is declining and the best workman has lately abandoned his trade and left the place.

29. The cloths of Wálajánagar and Arcot are all block-printed. The industry here must have been once very extensive and important. In nearly every house where the work is carried on, I found old blocks of very elaborate and beautiful patterns, many of them of Persian origin, piled up in corners or in the roof covered with dust, or in some cases cut in pieces and utilized for the patterns now in use, which are very poor and altogether inferior to the old ones. In one case there were as many as 72 blocks to form the pattern of one palampore. I was able to secure some 200 of these fine old blocks.

30. In this case also the trade is almost entirely an export one and the decline which has affected the industry artistically in such a remarkable way seems to have taken place within the last twenty years. The cloths now produced when finished are often so blurred that the patterns are altogether lost.

31. The second kind of painted cloth, used in Hindu sacred ceremonies, is very interesting and remarkable. The best are produced at Kálahasti in North Arcot. The quaint illustrations of scenes from the Hindu epics, the Ramayanam and the Mahabarata are exact reproductions of the style of Hindu temple sculptures with the same richness of architectural frame-work and elaboration of jewellery. But apart from their interest the wonderful effect of the arrangement of colour gives them an artistic value of a high order. Similar ones differing only in colour but not drawn with the same dexterity are produced at Salem. In both these places a few good patterns of palampore without figures are made in which the sacred tree and swan or the lotus form the leading motif. Those of this latter kind made at Salem are excellent in design and superior in this respect to the Kálahasti ones. The Kálahasti palampores attracted some attention at the last Calcutta Exhibition, but those of Salem are, I believe, quite unknown. There is also one old man at Madura who formerly produced painted cloth of a similar character, but he has now given up the work as there is no demand for it.

Kálahasti.

32. With regard to metal-work, that in brass and bronze is the most extensive industry. Commercially it has declined little, except that kerosine lamps are fast taking the place of the old native oil ones. But the fine ornamental work for which the south is famous has become almost a lost art. Even the ornaments and vessels of the temple service, which have always, as in other countries, called forth the highest skill of the artificer, are now in the case of the former generally inferior in design and rudely executed, and on the latter entirely without ornamentation.

*Metal-work.*

33. The Hindu custom of melting down all old vessels every two or three years has nearly destroyed all vestige of the work of previous generations, so that one must look for examples of the fine old work not in temples nor in the houses of the rich, but among the waste metal of the brass bazaar doomed to the melting pot, or in the houses of the low caste poor who generally look upon these with superstitious veneration and rarely consent to part with them.

34. The little demand which still exists is chiefly confined to the lower castes and the tendency being more towards cheap production than excellence of design or workmanship, it is not surprising that modern work is altogether inferior. The inlaid copper and silver ware of Tirupati is the only purely native work for which there is now any demand. It has degenerated completely in style and execution.

Tirupati.

35. The encrusted work of Tanjore is probably not entirely of native origin. It is strictly fancy work, not always in the best of taste, and as the demand for it is entirely European, consequently its prosperity does not appear to have been affected at all.

Tanjore.

36. A few brass-workers there are who have found exercise for their skill in the making of locks and safes ingeniously contrived. One man is at Dindigul who has acquired considerable reputation, another at Máyavaram, Tanjore district, and a third at Ramnad.

*Locksmiths.*
Dindigul.
Máyavaram.
Ramnad.

37. The Madras Museum possesses some magnificent specimens of arms and armour which show to what a high state of perfection the ironsmiths of the south once brought their art.

*Iron-work.*

38. Now three workmen at Sivaganga, in the Madura district, are the sole descendants who retain somewhat of the skill of their forefathers or who find any employment for it. And just as the skilled workman in bronze, brass and iron is now reduced to the level of common workmen, so the wood carver is obliged to maintain himself in great part by doing the work of an ordinary carpenter, for it is no longer the fashion for the wealthy merchant to adorn the interior of his house with rich carvings, and the architectural decoration of the Rajah and the Zemindar never aspires higher than an imitation of that bold and often grotesque travesty of the Italian style which characterizes Anglo-Indian buildings.

Sivaganga.

*Wood-carving.*

39. The goldsmith is still to be found at work in every town and village of importance, and his art has probably suffered least of all, for the women, more conservative, have not given up their traditional ornaments or exchanged them for European jewellery. On the other hand where, as at Trichinopoly, a European demand for his work has sprung up, he has become, artistically speaking, completely ruined, and has not even attained to that high mechanical finish and polish which is the only excellence in the type of jewellery he strives to imitate.

*Goldsmiths.*

Trichinopoly.

40. Pottery of an ornamental character is made only at Kulgherry in North Arcot. Unfortunately the two men who produce it seem to have been made the subjects of the crude experiments of every European who has come in contact with them; and their pottery is only remarkable for its inferiority to old Arcot ware and for its strange perversions of European forms.

*Pottery.*
Kulgherry.

41. A complete list of these and other minor industries I have attached to this report in Appendix A, and a notice of some of the processes in Appendix B.

42. I have already noticed to some extent the causes of the decline which is so clearly marked in nearly every branch of native art. The production of articles of necessity, such as the native cloths, has suffered most by direct European competition. Industries in articles of luxury, such as wood-carving, carpet-weaving and ornamental metal-work, have been affected to some extent by the decline of many old native Zemindaries and States, but more from the spread of European education and ideas, which lead many of the better class of natives to throw aside their national dress and

Causes of decline.

decorate their houses in a pseudo-European style with glaring Brussels carpets and ill-designed furniture, and either to look upon all native art as beneath their notice or with condescending benevolence to supply the workmen with designs culled from the pattern books and catalogues of European manufacturers. In this way the native industries have suffered as much by loss of prestige as by European competition or from any other cause.

43. In the north of India the beauty of its industries has always commanded a certain amount of admiration with a few, but in this presidency it is only of late years that the idea has generally gained ground that there is any native art, much less that any good is to be found in what little there may be. The majority of Europeans know nothing of it, except those few who benefit by its commercial ruin, and the means of obtaining any information with regard to it are very scanty. It is a remarkable sign of the indifference with which it has hitherto been treated, that while South Kensington, the finest Art Museum in the world, has thought Indian and Oriental art worthy of the largest proportion of its space, neither in Madras, Bombay, or Calcutta has there been, until quite recently, even a small collection to represent to any extent the resources of the country in its arts and industries.

The collection at the School of Arts, to which one would naturally look for an index to the industries of the presidency, consists principally of a mediocre collection of casts from the antique and details of Italian and Gothic ornament.

44. The specimens of native industry which I have purchased from the grant sanctioned for that purpose will make a beginning in the right direction; but I would strongly recommend that the survey which I have commenced may be continued; that provision be made for an annual grant for the additions to the collection which are needed; and that a museum be formed in connection with the school representative of all that is best in native art, and especially in that of Southern India. With regard to the question of its connection with the School of Arts, it is to be considered that there is ample space for a very considerable collection and a staff available, and that a large collection of the best examples of native design in every branch is absolutely essential for the future success of the school. Such a collection must, as is the case at the National Art Training School at South Kensington, be the most important teaching agency. To place this collection in any other building would practically render it of very little value to the students and add seriously to my work of superintendence, which is already very heavy.

45. That a museum of this kind would do much good to native industry can hardly be doubted. Indeed, I am convinced that properly directed its influence would be far more beneficial than that exercised by international exhibitions, which, though of great value in many ways, tend to lower the artistic standard by creating an indiscriminating demand. It would give a prestige to native art in the eyes of the natives themselves, and create an interest with regard to it by affording information in every branch of it, which now it is almost impossible for a European to obtain; it would be the means of preserving those examples of a period when art attained a much higher standard than is generally to be found at the present time, and which are daily being destroyed and becoming more difficult to obtain; it would thus create and maintain among the artizans themselves a higher standard of a design and workmanship; and it would afford the means of enlightening that class of artistically ignorant Anglo-Indians, dilettanti, and manufacturers, who persist in attempting to teach where they have much to learn, and who, if they possessed but a little of the artistic instinct of the native artizan, would shudder at the mischief which they work.

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## APPENDIX A.

### LIST OF ARTS AND INDUSTRIES CARRIED ON IN THE DISTRICTS OF NORTH ARCOT, SALEM, TANJORE, TRICHINOPOLY AND MADURA.

In nearly all the towns and villages mentioned below goldsmiths and wood-carvers are to be found more or less skilful. I have noted the places where their work is particularly remarkable.

Industries marked † are those which are little or quite unknown (as carried on in the locality referred to), or which have been unrepresented in previous International Exhibitions.

#### North Arcot.

*Arcot.*

Weaving-

(Fine and common female cloths.)

Imitation silver and gold lace—

(Sometimes stamped in simple patterns. Worn by Muhammadan children for caps, etc.)

Manufacture of silver wire—

(For silver and gold lace.)

Printed cottons—

(Similar to those of Wálajánagar.)

Brass and bronze work—

(One man, Nyana Asari, can make pierced ornamental trays and chumbus, etc., of Muhammadan design.)

*Arni.*

Weaving—

(Male and female cloths.)

*Chittoor.*

Weaving—
(Cotton female cloths.)

*Gudiyàtam.*

Weaving—
(Fine silk female cloths, fine male cloths, and cotton female cloths.)

The cloths ordinarily made are inferior; but when called upon the weavers can produce fine silk and embroidered female cloths equal to the best productions of Kuttàlam or Kuranàd.

*Kálahasti.*

Palampores and printed cloths—
( Representing scenes from the Mahabarata and Ramayanam.)

Weaving—
( Common male cloths.)

*Kulgherry or Karigeri.*

A small village near Vellore where ornamental pottery is made generally with a green copper glaze. The forms are now mostly of an inferior European type.

*Kunnattur.*

A village near Arni where reed mats are made similar to those of Wandiwash.

*Maderpak.*

Weaving and cotton printing.

*Nemali.*

Weaving.

*Palmanér.*

Making and painting toys.

† *Sevvur.*

A village near Arni where Jain women weave coarse mats out of "Jehohai leaves" ( *Phœnix farinifera* ). The mats sometimes have simple patterns in red and black.

*Tirupati.*

Ornamental metal-work—
( Brass inlaid with copper and silver.)

Carvings of Hindu deities and toys in Red Sanders wood.

Weaving—
( Common male cloths.)

In a small village, four miles from Tirupati, small bronze images of Hindu deities are made. They are inferior in execution.

*Tittyput.*

A village near Ambúr railway station where fans are made of palmyra leaves, and often tastefully decorated in brilliant colours.

*Trichanur and Tirutani.*

Goglets and various vessels and Hindu images carved out of stone. Also made at Chinnavarikum (near Ambúr railway station).

*Vellore.*

Brass and bronze—
(Household utensils.)

Embroidery—
† One tailor who makes the embroidered canopies, which are used in the temple service of the Hindus and for sacred processions.

*Vellore Jail.*

Weaving—
Woollen and cotton carpets, reed mats, purdahs, coarse cloths, etc.

*Wálajánagar.*

Weaving—
( Fine and common female cloths.)

Woollen carpets—
(Only made by the Muhammadans. They are inferior in design, and aniline dyes are often used.)

Cotton carpets—
( Aniline dye is often used in these also.)

Satin—

(Worn by Muhammadans as trousers. Very good in quality, colour and design.)

Printed cottons—

(Block-printed cloths and handkerchiefs of an inferior kind)

*Wandiwash.*

Weaving—

Reed mats—

(The patterns are generally very good in design, but they are often spoilt by aniline dye.)

Common male and female cloths.

SALEM DISTRICT.*

*Atúr.*

Reed mats.

*Hosúr.*

Bronze work—

† One man who produces very fine images of large size of the Hindu deities.

*Námakal.*

Weaving —

(Fine male cloths.)

*Razipur.*

Weaving—

(Fine male cloths and inferior female cloths.)

Bronze and brass work—

One workman is skilful in ornamental work.

*Salem.*

Weaving—

(Fine male cloths and inferior female cloths.)

† Palampores and painted cloths—

(Scenes from the Mahabarata and Ramayanam similar in style to the painted cloths of Kálahasti, but different in colour. The palampores are finely designed and superior to similar ones produced at Kálahasti.)

*Vániyambádi.*

Printed cottons—

(Inferior cloths for female wear, block-printed.)

Reed mats of an inferior kind.

TANJORE DISTRICT.

*Ayyampet.*

Weaving—

(Cotton and silk female cloths, satin similar to that made at Wálajánagar in North Arcot. Cotton carpets, woollen mats or small carpets of very bold and characteristic designs. All the textile productions of this village are remarkable for their good dyes and designs.)

*Kumbakónam.*

Bronze, brass, zinc, copper and silver work—

(Household utensils and figures of Hindu deities. The former are now generally plain or with only a simple device of two parrots engraved on them. There are, however, still a few workmen skilled in ornamental work.)

Painted cloths—

Hand-painted cloths and handkerchiefs similar to those of Nagore.

*Kuttálam and Kuranád.*

Weaving—

Very fine silk female cloths of striking beauty. Cotton female cloths.

*Mannárgudi.*

Weaving—

(Inferior female cloths.)

Brass and bronze—

(Plain household utensils.)

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* In nearly every town in the south of this district weaving of male and female cloths is carried on to some extent.

*Máyavaram.*

Locksmiths—

† One skilful workman who makes superior locks, safes, etc.

*Nagore.*

Cotton printing and painting—

(Cloths and handkerchiefs. The inferior kind are block-printed, but the better ones are very pretty in design and generally well executed. These are all painted by hand. Red, blue and sometimes yellow are the colours used.)

*Negapatam.*

Cotton printing—

(A few inferior workmen who produce cloths similar to those of Nagore.)

Cutting and polishing of precious stones.

*Shiyâli.*

Reed mats—

(Made at two villages close to Shiyâli. The designs are very fine and the dyes excellent.)

*Tanjore.*

Weaving—

(Very fine silk cloths for females generally richly embroidered with silver lace. Some magnificent examples of this kind of work are to be seen in the palace. Cotton female cloths.)

Metal-work—

(Chembus, trays and other vessels of bronze or copper encrusted with silver, brass or copper finely chased. The designs generally mythological in character. Household utensils.)

Pith-work—

(Models of temples, figures, etc., made out of pith.)

Talc fans—

(Ornamented with light and graceful designs painted in fine lines either in white or coloured.)

Musical Instruments.

TRICHINOPOLY DISTRICT.

*Andimatum.*

A village near Jayankondasholapuram where coloured glass toys are made.

*† Ariyalur.*

Weaving—

Satin of remarkable beauty of colour embroidered with tasteful designs generally arranged in stripes. Worn by native ladies.

*Jayankondasholapuram.*

Weaving—

(Common white male cloths.)

† At a village four miles from this place hand-painted cloths and handkerchiefs are produced similar to those of Kumbakónam and Nagore.

*Karumbalur.*

Brass and zinc work—

(Ornamental work of a unique character. Trays, chembus, etc., are cast in the two metals which form by juxta-position different designs, somewhat barbaric in style. The work is chiefly interesting for the process. Only one family are engaged in the work.)

*Lálgudi.*

A wood and ivory carver named Valayuda Asari carves very skilfully small images of Hindu deities and small animals, etc. He also makes ornamental carved flower-stands of most atrocious *a quasi*-European design, but the work is always skilful in execution.

*Trichinopoly.*

Gold and silver work—

(The chief goldsmiths produce work of a very debased European character.)

Weaving—

† (Silk and cotton female cloths and an inferior kind of satin embroidered with patterns in silver lace worn by Muhammadans.)

Carved pith-work—
(Models of temples and other buildings and of figures.)

Paintings on talc and ivory.

*Uraiyur.*

(A suburb of Trichinopoly.)

† Cotton-printing—
(Palampores often very rough, but sometimes very good in execution, design, and colour.)

MADURA DISTRICT.

*Appacottay.*

Weaving—
Cotton female cloths.

*Dindigul.*

Weaving—
(Similar to that of Madura.)

Sankalingasari brass and bronze work—

Household utensils without ornamentation. There is one locksmith, Sankalingasari, who has acquired considerable reputation for his skilful contrivances.

*Madura.*

Weaving—
Fine male cloths embroidered with silver lace, silk cotton female cloths, the latter especially remarkable for their beauty in colour and taste in design. Turbans.

Palampores—
† (One man who can produce palampores similar in style to those of Salem and Kalahasti. There is no demand for his work now.)

Manufacture of silver lace, brass and bronze work—

(Household utensils without ornamentation.)

Some of the goldsmiths are very skilful workmen.

Dyeing—
Madura is especially famous for its indigo and deep-red dyes.

*Mana-Madura.*

† Painted cloths—
One man who produces hand-painted female cloths and handkerchiefs worn by Muhammadans. Similar ones are made at Permagudi and Pamban, but this man's designs are generally bolder and more suited to the process.

*Pamban.*

† Painted cloths—
(Similar to those of Permagudi, Mána Madura and Pamban.)

*Permagudi.*

Weaving—
(White male cloths and female silk cloths of similar patterns to those of Kuttalam and Kuranad in Tanjore.)

† Painted cloths—
(Designs drawn and with a fine metal instrument very effective at first, but almost lost when the cloth is dyed.)

*Ramnad.*

† Locksmith—

One man, Najina Muhammad, who makes very ingenious contrivances in locks, safes, etc. Some wood-carvers of Ramnad are very skilful workmen.

*Sivaganga.*

Brass, bronze, and iron work—
(Three men whose time is generally employed in making inferior models in bronze of toads, lizards, snakes, etc., for which there is a considerable demand, and extravagant prices are paid. But the men are capable of much better work in laying iron with silver and in highly ornamental wrought, cast and chased arms, etc.)

‡ Decorating ivory with painted ornament—

One man, Suppaiyya Asari, who paints ornamental designs on ivory boxes, etc.

## APPENDIX B.

### MADURA RED DYE.

Madura is famous for a fine dye of a deep red colour. The dye is also prepared in many other places, but Madura has acquired a reputation for finer colour and greater permanence, which is attributed by the weavers to the peculiar qualities of the water of the Vaigai.

The process is as follows:—The ashes of a plant called by the natives Umiri,* which grows wild on sandy beds near the sea coast round about Ramnad, Râmesvaram and Tuticorin, are steeped in water for ten days when the water is poured off and the white cloth is dipped in the sediment and left for three or four days. When it is taken out and washed the cloth has a yellowish grey colour.

* Salicornia Indica.

Next it is dipped in a liquid prepared out of Tinbura root (a small shrub) growing on the banks of the Vaigai.

Kaya † leaf and gingelly-oil prepared in the following manner: The root of the Tinbura is pounded and boiled in water for six or eight hours until the water is a deep red. To this are added leaves of the Kaya leaf well dried and reduced to powder and gingelly-oil in these proportions: Tinbura decoction 16 parts, Kaya leaf 2 parts, and gingelly-oil 2 parts. The cloth is left in this liquid for two days, when it is taken to the bed of the Vaigai and left in very shallow running water for a day, after which it is dried in the sun. It is re-dipped in the dye and again washed in this way for ten or eleven days, when the operation is complete. The whole process is very tedious, sometimes lasting over a month. During the rainy reason all operations are suspended.

† Memecylon Tinctorum.

### Painted Cloths.

The hand-painted cloths of Kumbakónam, Nagore and other places are prepared as follows:—The white cloth is first steeped in a preparation of gallnuts boiled in milk for five or six hours, and allowed to remain for two days. Then it is taken out and dried in the hot sun on the sandy bed of the river or in the prakara court of the temple. The patterns are then drawn on the cloth by a rude brush with melted wax. The cloth is steeped in the dye for a sufficient time when the wax is removed by hot water, the patterns appearing white on a blue or red ground, as the case may be. If only one colour is desired, the cloth is complete, otherwise all but the portions of the pattern in which a second colour is to be introduced is coated with wax. When the cloth is again dyed and the wax being removed the process is finished.

### Brass and Zinc work of Kurumbalur.

The brass portion of the vessel is first modelled in wax and cast in the ordinary way by surrounding the model with a mixture of clay and sand, melting out the wax and pouring in the molten metal. This process forms a brass vessel apparently roughly pierced in simple designs, which is again surrounded by a mould and the molten zinc is run into the perforations. The vessel is completed by filing, chasing, and burnishing. Each vessel generally requires to be cast in separate portions which are afterwards soldered together. Only one family is engaged in this work.

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## *(b) Note on Mr. Havell's tour by the Director of Revenue Settlement and Agriculture.*

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Endorsement by W. Wilson, Esq., Director of Revenue Settlement and Agriculture, dated Madras, 13th March 1885, No. 443.

Submitted to Government in reference to G. O., No. 1044, dated 16th September 1884.

2. Mr. Havell's tour embraced the districts of North Arcot, Salem, Tanjore, Trichinopoly and Madura, and his report deals with the following arts and industries that are practised there:—

| | |
|---|---|
| (1) Weaving. | (4) Metal-work. |
| (2) Spinning. | (5) Wood-carving. |
| (3) Cloth-printing. | (6) Pottery. |

3. The general condition of all these industries is in Mr. Havell's opinion unsatisfactory, not one of them can be said to be flourishing, while some appear to be fast dying out.

4. Commercially the weaving industry which, considering the numbers engaged on it, is by far the most important, has suffered very seriously in its main branch, *viz.*, the manufacture of cloth, of cotton, silk and mixed materials for men and women's wear from competition with the cheap machine-made fabrics of foreign looms.

5. This competition grows stronger every day and the whole industry must, Mr. Havell thinks, soon disappear so far as low caste or purely cotton goods are concerned, the only part likely to be able to hold its own being a small remnant in the shape of the finer manufactures wherein silk is used either wholly or partially.

6. Artistically speaking the decline is noticeable only, Mr. Havell says, in the women's cotton cloths which, except in the case of those manufactured in Madura, have lost their characteristic beauty from the use of European dyed thread.

7. The carpet industry has similarly declined both commercially and artistically.

In Ayyampet, of Tanjore, where ten years ago 107 families were engaged in the manufacture of woollen carpets, there are but twelve now. In Tanjore which was once famous for silk carpets of remarkable beauty, Mr. Havell could not find a single workman engaged in the industry, while in Wálajánagar, of North Arcot, the silk carpets of which also were at one time in repute, the industry is practised by only two families whose wares were noticeable, Mr. Havell says, only for the inferiority of their designs and the use of aniline dyes.

No. 5 (b). Industrial Arts in MADRAS, 1885.

The cotton carpet industries of North Arcot, Tanjore and Trichinopoly are declining both commercially and artistically, the decline of that of Wálajánagar in North Arcot, being, in Mr. Havell's opinion, due probably to the competing influence of the similar industry in the neighbouring Vellore jail which was stopped too late to enable the independent industry to recover itself.

8. The only branch of the weaving industry that has not suffered, Mr. Havell writes, from European competition is the manufacture of reed mats, the best specimens of which are produced at Shiyáli and Wandiwash.

9. The census figures may be quoted in confirmation of Mr. Havell's statements that many weavers have been forced to abandon their trade for other pursuits.

In 1871 there was a male weaving population of 540,061, against 431,773 in 1881 (*N.B.—Women were not censused in 1871 according to their professions*); this is a decline of over 20 per cent., and though part of it may doubtless be ascribed to the famine of 1876-77, that will not account for it all, nor perhaps for more than a fraction of the decrease.

10. Mr. Havell speaks of the satin fabrics of Ayyampet, Arcot and Wálajánagar as a beautiful industry that has hitherto attracted little notice. These satins are used by Muhammadans for trousers and under the familiar name of "Kincob," are by no means unknown.

Mr. Havell draws attention to a variety of satin that he found manufactured in Uraiyur of Trichinopoly, and used to make the bodices worn by native ladies. This industry, which he found followed by only two men, Mr. Havell believes has never been noticed before.

11. The spinning of cotton which was at one time an industry of great importance has now dwindled to insignificance owing to the competing influence of cheap foreign machine-made thread.

Country thread is now used only in the manufacture of the coarsest cloths and cotton carpets.

12. The art and industry of printing on cotton cloth deals with two classes of goods—

(1) Palampores used for personal adornment or as bed-covers.

(2) Illustrations of Hindu mythology used for the decoration of cars and temples and as wall-hangings on festive occasions.

The former class of goods are either hand-painted or block-printed and are produced at Kumbakónam, Nagore, Uraiyur, Mána Madura, Permagudi, Pámban, Wálajánagar and Arcot.

The latter are hand-painted and are produced at Kálahasti, Salem and Madura. Of these Mr. Havell writes that "apart from their interest, the wonderful effect of the arrangement of colour gives them an artistic value of a high order."

The trade in the former class of goods is chiefly an export one,—to Penang and Singapore—but it has in the last 20 years declined, Mr. Havell thinks, quite 80 per cent., the decline being due to the supersession of these goods by cheap English prints.

Artistic degradation has followed commercial decline; the patterns now in use are very poor and altogether inferior to the old.

Mr. Havell notices the sacred palampores of Salem which he believes to be quite unknown.

13. In metal-work Mr. Havell says that the brass and bronze industries which are the most extensive have commercially declined but little, the only noticeable thing being the supersession of the old native oil lamps by cheap kerosine ones. Artistically however there has been a great retrogression, and the fine ornamental work for which Southern India was once famous has become, Mr. Havell writes, almost a lost art.

The modern tendency is more towards cheap production than excellence of design or workmanship, while the acquisition of specimens of the fine old work of previous generations is, Mr. Havell says, made difficult, if not impossible, by the Hindu custom of melting down all old vessels.

The artistic worker in iron and wood has disappeared with the cessation of the need or demand for his wares owing to changed conditions and changed tastes.

The goldsmiths' of all the arts has suffered least whether commercially or artistically from European competition and contact. This is due in Mr. Havell's opinion to the conservatism of the native women who have not given up their traditional ornaments, nor exchanged them for European jewellery. This alone would not have preserved it from decadence; the fact that jewellery is not an article that lends itself to cheap reproduction by machinery is what has probably saved the Indian goldsmiths' art from invasion and, as Mr. Havell apparently thinks, inevitable deterioration by European competition.

14. Pottery of an ornamental character Mr. Havell found only at Kulgherry in North Arcot but its forms were debased owing to the evil influence of European contact, which, in Mr. Havell's opinion, seems to have been artistically disastrous to every Indian industry that it has touched.

15. The causes of the decline—commercial and artistic—in these arts are, in Mr. Havell's opinion, the overgrowing competition of cheap European goods in the case of articles of necessity, and in the case of *articles de luxe* in some small degree to the decay and extinction of Native States and Zemindaries, but chiefly to the spread of European education and ideas among the wealthier classes.

16. Mr. Havell, alluding at the close of his report to the uselessness of the present collection at the School of Art as an index to the arts and industries of the presidency, claims for the purchases he has made in the course of his tour the merit of being a step in the right direction to the formation of an Art Museum which would in his opinion exercise the most important influence on native art. The influence which Mr. Havell speaks of is conservative and progressive. But the influence of such a collection might not improbably have an altogether different effect in respect of some at any rate of the industries that Mr. Havell has dealt with; it might hasten their decay and extinction by giving to the European manufacturer, whose agents are everywhere, the opportunity of copying and cheaply reproducing patterns, access to which he now finds difficult owing to the increasing jealousy and reserve of the last remnants of a dying race of artists.

17. The Art Museum which Mr. Havell wishes to see established should in his opinion be formed in connection with the School of Art where there is plenty of room for it. To house it in any other building would in his opinion be to detract from its practical value as an educational agency, and would, Mr. Havell says, add much to his labour of superintendence. This is a matter which it is for Government to decide upon. Mr. Havell's opinions are not at one on the point with the views expressed by Government in their Order of 21st February 1885, No. 895, Revenue Department.



## *(c) Order of the Madras Government on Mr. Havell's report.*

No. 463, Revenue, dated 24th April 1885.

Recorded. The Government observe that while Mr. Havell's researches have not resulted in the discovery of any new industries, a result which was hardly perhaps to be anticipated, they serve to establish a number of useful facts in regard to the condition and distribution of industries already known. From this point of view Mr. Havell's Appendix A, which consists of facts alone, is the most interesting part of his report. The Government are of opinion that the inquiry thus begun should be continued during next cold weather. The Director of Agriculture will submit his recommendations in due course as regards the districts to be visited by Mr. Havell during his next tour of inspection.

2. As desired by Mr. Havell, the articles collected by him will be retained in the School of Arts for teaching purposes.

## *(d) Second report by Mr. Havell on industries in Madras.*

READ—the following report from E. B. HAVELL, Esq., Superintendent, School of Arts, on special duty, to the Director of Revenue Settlement and Agriculture, dated Madras, 28th May 1886, No. 90 :—

With reference to G. O., Mis. No. 3, dated 5th January 1886, I have the honor to submit my report on the arts and manufactures of the districts of Kistna, Godávari, Vizagapatam and Ganjam. I have visited all the important places in these four districts and obtained as much information as possible regarding other places which time did not permit me to obtain by personal enquiry.

2. *Unknown Industries.*—It is necessary to make a reservation with regard to this description. I very much doubt whether it would be possible to discover in any country an industry which is new in the sense that the entire principle or process of it is altogether unknown. I include under this head one or two arts which have not been represented in the Madras collections for the present London Exhibition or in Calcutta in 1883-84, and concerning which, as far as I am aware, nothing has been recorded in any books of reference on the subject as to their existence in this Presidency.

3. *Lacquer Work.*—The most important is a kind of lacquer work on wood used by a workman in the service of the Zemindar of Mandasa in Ganjam. A similar method of decoration has been practised in the Punjab and formerly was largely used in Saracenic architectural decoration of interiors in various countries. In Cairo and Damascus especially there are magnificent examples of it. It is identical with old Italian "Gesso" work. The style of design has however much of the character of Madras work about it so it is not merely the discovery of a Punjabee workman in Madras. This man originally came from Kondapilly in Kistna. The only Madras work which can be compared with it is the lacquer work of Kurnool which is perhaps the finest Indian "Gesso" work now practised anywhere. I have not been able to obtain a description of the Kurnool process, but I have no doubt that it is similar to that of Mandasa. In style there is no similarity between the two, the Mandasa work being much bolder and suitable for decoration on a large scale, while Kurnool lacquer could only be employed satisfactorily on boxes, trays or articles of furniture.

4. The ornament is raised in very bold relief so that it at first sight has the appearance of wood-carving. The colours are painted on a ground-work of silver foil which gives them a very brilliant effect. Some parts are gilded and small pieces of bangle glass with silver foil at the back are used in the ornamental detail. The whole process is described elsewhere. Only one man can do this work.

5. The other industries are not of much significance :—at Peddápuram in Godávari one weaver prepares cloths of a fine silk gauze, or muslin brocaded at the ends. They are worn by Zemindars or wealthy people as a kind of ceremonial costume, but are so fine that they are not suitable for ordinary wear. Similar stuff was formerly made at Trichinopoly, but I believe the manufacture has died out there.

6. At Kondapilly one man stamps leather in ornamental patterns for books or boxes and desks. He has, however, only one stamp—an heir-loom of his family—with two designs on it. One design is very simple and the other elaborate, but more suitable for a box-lid than for a book cover.

No. 5(*d*).
Industrial Arts in MADRAS, 1886.

7. At Kuppookonda in Kistna one man and his family turn very neatly in stone minute boxes for holding native ladies' eye-*paint and kunkum.*

8. New localities for well-known industries and details regarding them which are, I believe, more complete than any which have been hitherto given, will be found below and in the appendix to this report. The localities in which the various industries are carried on are entered in the margin against the paragraphs referring to each.

9. *Cotton Manufactures.*—Cotton-weaving may be divided into two chief classes—coloured cloths and white cloths. Inferior coloured cloths of European dyed twist are on special order made by weavers of white cloths, but the main divisions of the industry are represented by these two classes.

*Kistna.*
Addipalle. Bhattiprolu. Chirala. | Vetapálem. Razapet.

In these districts there are two distinct varieties of coloured cloths ; the first is made at Chirala and Vetapálem and other places in the Kistna District. The speciality of these places is a well-woven and finely-dyed cloth worn as a dhoti by Mahomedans throughout the Northern Circars and exported largely to Hyderabad. The body of the cloth is woven with thread of the fine red dye prepared from the plant "Seruvêr" (*Hedyotis umbellata*, Lam.); a plain white band runs on each side throughout the length and across the ends broad bands of blue (indigo) are woven. For European use it would be very effective as a curtain. The handkerchiefs for Mahomedans made at the same places are of the usual check pattern and are not remarkable.

*Kistna.*
Pedana. | Polavaram.

At Pedana near Masulipatam there is a considerable industry in dhoties and coloured cloths also sent to Hyderabad, but they are of an inferior description and mostly woven with imported dyed twist.

Vizagapatam.
Rájam.
A few looms at Allipore, Vizagapatam, Palasa, Ganjam.

10. The second variety of coloured cloth is made at Rájam in the Vizagapatam District. They are cloths for female wear, but are worn by males also among the hill tribes. The body of the cloth is plain but the edges and ends are embroidered with wide and more elaborate bands than is usually the case. Special patterns are introduced in the embroidery to suit the taste of the hill-people by whom they are worn as part of their war or festival costume. Imported dyed twist is generally used, indigo being the only dye of native production. The most effective variety of cloth has a plain dark-blue ground, embroidered at the edges and ends with patterns in yellow and white or with silver lace. As regards material and manufacture, they are generally superior in quality, and the contrast of the richly-worked borders and ends with the plain ground is effective.

11. The manufacture of white cloths for native use may be divided into three classes—first coarse cloths of country thread ; second, cloths of various degree of fineness, none remarkably fine, all of imported twist ; and, thirdly, fine muslin cloths either of country or imported thread.

Chiefly in the south-west of the Kistna District.

12. Cloths of the first class are of coarse but strong texture worn chiefly by poor agriculturists of both sexes.

The cotton is spun by the female members of a family and handed over to the weaver, who receives payment for the cloth generally in the form of grain.

The cost of production is somewhat higher than the price of a machine-made cloth, but being of stronger texture and warmer, it is preferred by the class of people for whom it is made.

It is not sold in the bazaars, but only made to order; and no European cloth is precisely similar to it.

13. Weavers of this class of cloth are scattered throughout the villages and towns of cotton producing districts, but never in large numbers together as the demand is limited.

All over the four districts.

14. The production of the second class of cloth engages the main part of the industry.

The cloths are of various degrees of fineness; from a common description with a plain edge and a band at the end of coloured thread, to superior cloths with embroidered edges and bands of silver brocade at the ends.

The lace or brocade is not generally genuine, *i.e.*, of real silver, unless specially ordered. All the materials used in these cloths are of foreign manufacture, except that on special order country-spun thread will be used. With a slight difference as to the bands across the ends they are worn by both males and females.

*Godávari.* Uppada. *Vizagapatam.* Allipore. Anakápalle. Boddam. Pandur. Penubaka. | Srípuram. Vizianagram. *Ganjam.* Berhampore. Boodsthy. Chicacole. Itchápur. Mandasa. Narsipettah.

15. These two classes of weavers are common to nearly all districts. The third is a special class only existing in a few places in the Presidency. The cloths are made either of a fine country-spun thread known as "silk-weaver's cotton" or of imported thread equally fine. The former is spun by a class of people living in some localities in the Godávari, Vizagapatam and Ganjam Districts. They do not belong to the silk-weaver's caste, so the name is probably derived from the fineness of the cotton. The thread is not generally made finer than fine imported thread, but it speaks much for its durability that people are willing to give as much as Rs. 15 for a plain cloth (for ordinary wear) woven with it when they can buy a similar cloth (also hand-woven) of machine-spun thread for about half the price. This industry is specially noteworthy as showing the direction in which the native handicraftsmen may find a field in which they have nothing to fear from European manufactures.

Chicacole.

16. Chicacole muslin is of this description of manufacture, only that simple flowers or stripes of coloured cotton are interwoven with the cloth.

17. *Miscellaneous.*—Besides these three classes, cotton cloth of various description for European use is produced, but the industry is small. At Pedana, near Masulipatam, table-cloths and cotton cloth for European wear are made at a few looms. Chicacole muslin is sometimes used for European ladies' dresses and at one or two places the weavers supply the small local demand for cotton cloth, bed-ticking, etc.

| *Kistna.* | *Vizagapatam.* |
|---|---|
| Pedana. | Allipore. |
| *Godávari.* | *Ganjam.* |
| Rajahmundry. | Chicacole. |

18. The hill-people in the tracts of Vizagapatam and Ganjam weave rough cotton cloths with coloured stripes, red and blue, sometimes slightly embroidered. The best I saw were those worn in the Goomsur maliahs of Ganjam.

| *Kistna.* | *Vizagapatam.* |
|---|---|
| Vinukonda. | Jamee. |

19. Cotton carpets are made at one or two places in these districts, but they are not different to those made in other parts of the Presidency.

20. *Cotton-spinning.*—I have already referred to two descriptions of country-spun thread. The first is the very coarse thread spun by the females of an agriculturist's family in every cotton-producing district. "Silk-weaver's cotton" is spun by a particular class only in the villages near Uppada in the Godávari District, Anakápalle and Pandur in Vizagapatam, and Chicacole in Ganjam. Formerly it is said that the demand for it was large so that it formed a separate industry in which whole families were engaged. Now only females are occupied in spinning, while the men have become weavers. Chiefly in various villages in the north-east corner of the Godávari District another description of fine thread is spun known as "Palkee-bearer's cotton." It is not so much in demand as "silk-weaver's cotton," and the quality is inferior.

21. *Silk-weaving.*—A special description of silk fabric made at Peddápuram has been before noticed. Fine silk-cloths and cholis are also made at Jaggayapet in Kistna and Berhampore in Ganjam. They are either plain cloths with the usual borders or they sometimes have simple flowered or checked patterns. Though generally well woven and of good colour they are not specially remarkable compared with other Indian fabrics of the same class.

| *Kistna.* | *Godávari.* | *Ganjam.* |
|---|---|---|
| Jaggayapet. | Peddápuram. | Berhampore. |

22. At Jaggayapet seventeen families of the Dasiri caste weave cloths of tasar silk obtained from Hyderabad.

23. At Pandur and other places the finer cotton cloths often have silk borders embroidered or plain.

24. The colour most used is the crimson produced from lac, and the cloths of Berhampore, unless specially ordered, are all of this colour. Deep yellow, green, grey and several tints produced by varying the color of the warp and weft can also be obtained at Jaggayapet, seldom at Berhampore. Indigo-blue and white cloths are made to order.

25. *Woollen Carpets.*—Carpets are made only at Ellore and Masulipatam. The native demand is confined to small mats or rugs, but large carpets are made for European firms. The patterns are bold in character, of a floral type generally, on a white ground with a coloured border, but sometimes the centre ground is of one colour, either red or dark grey, entirely plain.

| *Kistna.* | *Godávari.* |
|---|---|
| Masulipatam. | Ellore. |

The dyes in use are all native and prepared by the weavers themselves.

There is no distinction between the manufacture of the two places except that the best and largest carpets are made at Ellore.

26. *Reed Mats and ornamental Basket-work.*—Plain reed mats are made at Ayyanvole in the Kistna District and in the Goomsur maliahs of Ganjam and some of the hill tracts of Vizagapatam. Ornamental patterns will be made to order at Ayyanvole.

*Kistna.*
Ayyanvole.
Hill tracts of Vizagapatam and Ganjam.

27. The mats and basket-work of Parlákimedi are distinct in style. The only native dye in use is black and when the patterns are worked with this, the contrast with the silver grey of the undyed reed is very pleasing. Unfortunately nearly all the work is carried out with aniline dyes and it is difficult to get any patterns without them. Fancy baskets, flower-stands, cheroot cases, etc., are made all of common European shapes.

*Ganjam.*
Parlákimedi.

28. *Palampores.*—The printed cotton cloths of Masulipatam consist of canopies, screen cloths, prayer cloths, men's handkerchiefs, turbans, cloth for Mahomedan jackets, and women's cloths. Canopies and screens and other cloths entirely hand-painted, generally with patterns of the "tree of life" type or mythological subjects, are only made by three families on special order. Every description of cloth, except the cheaper cloths with patterns only in red outlined with black on a white ground, is partially hand-painted. This will be explained under "processes." It would be useless to attempt to describe all the different varieties, but even the commonest and cheapest cloths are generally excellent in design and the brilliancy and happy arrangement of colour are especially remarkable.

29. There are three distinct classes of Palampores: first, those on a white ground entirely block-printed in red with a black outline; second, cloths printed in two or more colours (which may be red, light blue, dark blue, green, yellow, and a dark brown or black), either with a white or coloured ground—these are partially hand-painted; third, cloths in two or more colours entirely hand-painted.

| 1st and 2nd. | 3rd. |
|---|---|
| *Kistna.* | *Kistna.* |
| Jaggayapet (inferior). | Masulipatam. |
| Masulipatam. | *Godávari.* |
| *Godávari.* | Gollapalem. |
| Gollapalem. | Pallacollu. |
| Narsápur. | |
| Pallacollu. | |

30. At Pallacollu most of the printers make men's turbans and handkerchiefs and women's cloths of an ordinary kind. But there is one excellent workman whose hand-painted canopies and

screens are equal to any made elsewhere. The best have mythological subjects similar to those of Kálahasti in North Arcot (which are better known), but in drawing, intelligent composition and in other respects they are much superior. He also has some patterns of the "tree of life," but these are inferior in design to the similar ones of Masulipatam. Sometimes the effect is heightened with gold leaf fastened on the cloth with a kind of size and beaten in until it is firmly fixed.

31. I regret to say that since I visited Pallacollu I have heard that this man has become incapable of work through partial loss of eyesight. A few men were working under him, but were not so skilful.

32. At Gollapalem near Cocanada there are a number of Palampore printers who prepare inferior block-printed canopies and bed-covers. A few families also paint canopies, etc., by hand with mythological figure subjects, but these are inferior to similar ones made at Masulipatam and elsewhere. A few other places where Palampores are made are noticed in the appendix.

*Ganjam.*
Mandasa (in the service of the Zemindar.)

33. *Embroidery.*—Very fine embroidery work is done by one man in the service of the Zamindar of Mandasa. He embroiders silk on cloth for canopies or screens in fine bold patterns. His work is also superior in execution to any other Madras embroidery.

Industrial School, Vizianagram.

34. In the Industrial School at Vizianagram, a workman from Benares embroiders caps, etc., in the usual Benares style.

*Ganjam.*
Chikati (in the service of the Zemindar), Berhampore and elsewhere.

35. In the Ganjam District some Uriya tailors embroider a kind of appliquè work and patch-work in a quaint, though somewhat barbaric, style. The effect is spoilt by the use of inferior European materials.

36. *Gold and Silver Work.*—The usual ornaments worn by females in nearly every part of the Presidency are of the same style of design as elsewhere, but they are exceptionally well made throughout the Vizagapatam District. Some parts of the district are remarkable for special work.

*Kistna.*
Narsaraopet. | Venukonda.

37. In the Narsaraopet and Vinukonda taluks of Kistna, the silver belts worn by males are noteworthy. The belt itself is made of silver wire plaited together, over which highly ornamented bosses and flat plain bands are fastened alternately throughout the length. This pattern is not confined to any one District; but in these taluks of Kistna and in the adjacent district of Nellore, the ornament is much more elaborate and better designed than elsewhere. A gold smith at Narsaraopet has a reputation for good work of this kind.

*Vizagapatam.*
Anakápalle taluk.

38. In the Vizagapatam District the silver female ornaments worn by some of the lower caste are very remarkable for tasteful design and often for fine workmanship. I found the best in the Anakápalle taluk. They are quite distinct in style from ordinary Hindu ornaments, but have some resemblance to the brass jewellery of Uriyas in Ganjam.

*Vizagapatam.*
Bobbili. Pedapenki. Vizagapatam. | Vizianagram and other places.

39. In other places, more especially at Pedapenki, silver girdles in links (a "snake" pattern) are made most excellently.

*Vizagapatam.*
Bobbili and Párvatipur taluks and other parts.

40. Chiefly in the Parvatipur and adjacent taluk of Vizagapatam, the men wear pretty gold necklaces the patterns derived from various kinds of grain, paddy, dholl, etc.

Northern parts of the Ganjam district.

41. In Ganjam the Uriyas have many distinct patterns in gold and silver not found elsewhere.

All over the districts.
*Kistna.*
Nuzvid and other places.
*Godávari.*
Peddapuram.
Pithápuram and other places.
*Vizagapatam.*
Bobbili. Párvatipur. Rájem. | Vizagapatam. Vizianagram.

42. *Jewellers.*—There are many jewellers in various places and especially in the Vizagapatam District who make ornaments similar in design to those of the ordinary gold smith.

43. *Silver smith's Work.*—Silver and gold vessels, such as rose-water sprinklers, betel trays and boxes, chembus, etc., are made in several places noted in the margin.

*Ganjam.*
Belugunta and other places.
*Vizagapatam.*
Anakápalle. | Bobbili.
*Ganjam.*
Chicacole. Mandasa. | Parlákimedi.

44. *Damascening.*—A good many goldsmiths in various places in Vizagapatam and Ganjam can damascene on iron and steel. There is now no demand for such work, and none of them have done any recently or within the last four or five years.

*Kistna.*
Mylaveram and other places.
*Vizagapatam.*
Anakápalle. Bobbili. Kotapadu. | Párvatipur and other places.
*Ganjam.*
Belugunta and other places.

45. *Brass Work.*—Plain beaten work in chembus and common household vessels, for which sheet brass is used, occupies the greater number of brass-smiths. Cast work is done by the more skilful workmen who make bells for bullocks, superior chembus and drinking vessels, small images of Hindu deities, and occasionally lamps in bell-metal, besides ordinary beaten work. Images, lamps and architectural ornaments of large size are generally made by them of sheet metal.

46. Skilful brass-smiths make silver and gold vessels, such as those described under silver-smith's work.

*Vizagapatam.*
Párvatipur taluk.
*Ganjam.*
Belugunta.
Parlákimedi and many villeges bordering on the hill tracts.

47. The manufacture of personal ornaments is a special class of brass work found in the Vizagapatam and Ganjam Districts. The best are worn by the lower classes of Uriyas in the north of Ganjam and some of them are very excellent in design. In and near Parlakimedi some good patterns are also made.

48. Brass ornaments are also worn by the hill tribes in Vizagapatam and Ganjam, but as far as I could ascertain none of them are in the least remarkable unless from an ethnological point of view. However, I did not have an opportunity of direct investigation among the more remote tribes.

*Vizagapatam.*
Bobbili.
Kudur (near Kotapadu) and other places.

49. *Iron-work.*—There are a few blacksmiths in the Vizagapatam District who formerly made swords, spears and other weapons. As there is now no demand for such work, they confine themselves to rough knives for bandymen, razors, writing styles and miscellaneous articles of common cutlery.

All over the district.

50. Ordinary blacksmiths make tyres for country carts, agricultural implements, bolts and nails, etc.

51. The people in the hill tracts make rough " tangis " or battle axes and some other implements.

52. Country iron is used in parts of the hill tracts at Nuzvíd in Kistna and at Pàrvatipur and some other places bordering on the hill country of the Vizagapatam and Ganjam Districts.

Vizagapatam.

53. *Ivory and Horn Work.*—At Vizagapatam the ivory workers make all kinds of fancy boxes, desks, paper-knives, combs, and small articles of furniture. These are either wholly of ivory or of sandal-wood, rose-wood, or ebony inlaid or overlaid with ivory fretwork. Various patterns are etched on the ivory in black. They also make similar articles in horn, tortoise shell, and porcupine quills.

*Vizagapatam.* Mandasa. | *Ganjam.* Chíkati.

Some zemindars retain ivory carvers in their employ to make fancy boxes of inlaid work, to carve combs, images, or ornamental articles, or to make and inlay musical instruments.

*Kistna.*
Nuzvid.
*Ganjam.*
Antagudda. Palasa. | Parlákimedi.

In other places there is no regular demand for ivory work, but some carpenters or muchies, rarely goldsmiths, will work in ivory or horn on order.

54. Every ivory worker employs a black lacquer to heighten the effect of his inlaid work, but the country workmen, instead of simply incising the ivory in lines as in " Vizagapatam work, " will cut out the ground of the pattern deeply and fill in the hollows with lacquer. When not carried to excess this process is more effective, though more laborious than the simple engraving.

*Ganjam.*
Palasa and other places.

55. Ornamental combs of horn are worn by Uriyas in the Ganjam District. The ornament is produced by piercing the top part of the comb and by engraving patterns on it, the incisions being filled with a composition of silver and mercury. Horn boxes are also ornamented by the latter process.

56. *Wood-carving.*—Of wood-carving in these districts there is nothing to speak of. In some arts of Kistna there are a few fairly-skilled carvers who work in a mixed Mahomedan and Hindu style. In the other districts there is hardly any wood-carving to be found.

*Ganjam.*
Mandasa (in the service of the Zamindar) ; Antagudda and other places.

57. *Carved Fruit Shells.*—Two goldsmiths in the service of the zemindar of Mandasa carve cocoanut and bael fruit shells very finely. They are generally mounted in silver and converted into snuff boxes. Several goldsmiths in the northern parts of Ganjam professed to be able to do similar work, but only one, at Antagudda, could produce any specimen of it. I have seen it stated that these shells are carved by the hill tribes, but this is not the case.

Many places in each district.

58. *Store-work.*—There are many stone-cutters all over the districts who, besides dressing stones for building purposes, prepare mill-stones, stone pestles, and various vessels. When required stone figures are carved at Kooppookonda in Kistna, where small stone boxes are also very neatly made, Bobbili and Peddapuram in Vizagapatam, Chicacole, Mandasa, and Muttoora in Ganjam The stone-cutters at Mandasa and Muttoora can do fine architectural carving, but the demand for ornamental stone work is very limited.

*Kistna.*
Kondapilly.

59 *Toys and lacquered wars, painted work, etc.*—Wooden toys carved and painted are made at Kondapilly. They consist chiefly of small figures or groups of figures made of a very light jungle-wood (*Gyrocarpus Asiaticus*).

*Godávari.*
Narsápur.
*Vizagupatam.*
Nakkanilli.
Srungavarupukota.

At Narsapur, Godávari District, Nakkapilli, Srungavarupukóta, Vizagapatam District, small boxes used as pujah vessels and miniature models of native household utensils are neatly turned in wood and carved with a plain colored lacquer. The lacquer is also applied to the frame-work of cots, chairs, etc. These boxes and toys are found in almost every house in the Godávari and Vizagapatam Districts.

60. Besides wall decoration, ordinary muchie's work is to paint and decorate palanquins or cots, fans, trays, and other articles for marriage ceremonies and to make, paint and gild large wooden images and horses or dragons for Hindu cars. They also illustrate mythological subjects on wood or cloth. Many muchies make plain articles of furniture.

*Kistna.*

Kondavid.

61. *Paper*.—Paper of a coarse kind is made at Kondavid in Kistna by about ten families.

Kondavid.

62. *Scent*.—About twenty families at the same place extract the scented essence of jessamine.

PROCESS.

63. *Mandasa lacquer*.—A strong glue is first prepared from deer skin by soaking the skin in water for three days and afterwards boiling and straining it. This glue is ground with an equal part of white dammer and the powder is mixed with water to the consistency required.

Pieces of old chatties are then ground up into a fine powder, a process which is said to take several days. Three parts of this powder mixed with one of aloes are then added to the semi-liquid preparation of glue and dammer. The wood to be ornamented being first carefully planed and smoothed by rubbing pipe clay mixed with powdered tamarind seed and kanjee over it; this composition is repeatedly applied with a brush until the ornament produced is raised to height desired. This being accomplished a coat of white oil-paint is laid over the whole. The ground-work of the ornament is then covered with silver foil and the colouring proceeded with in the ordinary way with pigment ground in wood oil. Gilding and small pieces of bangle glass inserted as part of the ornament are used to heighten the effect. When the whole work is properly dried in the sun the ornament will stand washing and considerable rough usage.

64. *Spinning*.—The ordinary native method of spinning cotton is so well known that it is unnecessary to describe it. For "silk-weaver's cotton" there are some peculiarities in the process. By the ordinary method a rough mill or gin is used to separate the fibres or wood from the seeds but for this thread the operation is performed with a small iron rolling-pin entirely by hand.

The cotton is cleaned in the ordinary way with a bow.

The "carding," or disentanglement of the fibres, is accomplished with the aid of the upper jaw of a fresh-water shark called "Wallagu." For the same operation in Europe a kind of wire brush is used.

The spinning wheel and the spinning process are the same as used for ordinary country-spun thread, except that the wheel is lighter in construction.

65. *Palampores*.—The white cloth is first prepared by steeping it in a mixture of buffalo dung. It is then spread on the ground and water is thrown over it, but it should not be thoroughly washed. A solution of powdered gall-nuts (myrabolams) is next prepared, and the cloth, when dry, is steeped in this for one or two days. When it is again dried it is ready for the printing process.

*For Block-printed Palampores*.—If the pattern has a black outline a mixture is prepared from iron filings, jaggery and vinegar (sour toddy). This is placed in a shallow trough with a piece of flannel or thick cloth at the bottom. The face of the block is dipped in the trough and the impression on the cloth gives the outline of the pattern. The red colour is next applied in this way:—A second block cut for the details of the pattern intended to appear red is dipped in another trough in which there is a solution of alum and another impression is made. The cloth is now boiled in the dye prepared from Seruvêr (*Hedyotis umbellata*) and the leaves of *Memecylon tinctorium* called "jagiáku." As the dye only adheres firmly to the alum mordant the cloth comes out with patterns in red according to the design of the second block. The white ground of the pattern is however stained with the red dye and the cloth must be well washed with chunam soap and dhoby's earth (*soudu mannu*) to remove the superfluous colour.

Many of the cheaper palampores are left in this state, but if a second colour is required all of the details of the pattern which are required to remain red must be covered with melted wax applied with an instrument somewhat resembling a draughtsman's inking pen with the addition of a large pouch containing the wax through which the handle of the instrument passes. When this preparation is complete the cloth must be dipped in dye of the second required colour. The waxed portions of the cloth of course are not affected by the dye. The wax is afterwards removed by boiling the cloth. For every additional colour required, the waxing process must be repeated.

*Hand-painted cloths*.—For hand-painted cloths the only difference is that the whole work is performed without the aid of blocks.

66. *Brass Work*.—The brass-smith's work is either hammered or cast. He has no knowledge of the method of spinning.

The composition of ordinary bell-metal is 8 or 10 parts of copper to 6 of tin.

The old wax-process described by Cellini and used by all mediæval metal workers in their moulded vessels or figures, known to them as "cire perdue," is the only method of casting employed by native workmen.

In their ornamental work however they seldom avail themselves of the artistic capabilities of the process which old European masters developed so highly. So it is of some interest to find the tasteful patterns of the brass ornaments worn by the lower caste Uriyas in Ganjam made in this way. One curious apparatus is a hollow tube of bamboo into the end of which a moveable brass perforated plate is fitted. The wax is made sufficiently soft by heat and pressed through the perforations at the end of the tube by another piece of wood exactly fitting it. The wax comes out in long threads, resembling *vermicelli*, which are used to form various patterns for the brass ornaments. The fineness of the thread may be regulated by altering the gauge of the brass plate at the end of the tube. Other patterns are obtained by means of brass dies similar to those used by goldsmiths, and

when the wax model is complete the process is continued in the ordinary way by coating it thickly with mud, melting out the wax and pouring in the molten metal.



67. *Paper Manufacture.*—The process at Kondavid is essentially the same as in hand-made paper of European manufacture. Improved raw materials and knowledge of their properties are most necessary for the production of a better class of paper.

68. There is nothing specially noteworthy in the processes of other handicrafts.

69. *Dyes (Cotton).*—As a rule the cotton weaver buys European dyed twist in the bazaar. Only two native dyes are now used by the cotton weavers—red and blue.

The red produced from the root of the plant *Hedoytis umbellata*, called "Seruvêr," is used at Vetapálem and a few other places in the Kistna District. The wild plant produces the best dye.

The process is exceedingly tedious and the root expensive, and on this account "chiranjee" (*Morinda* bark taken from the roots of the tree) is often used to mix with *Seruvêr*. It gives an inferior colour and is less permanent. The *Seruvêr* itself, when properly prepared, is a fine colour and very enduring. Seruvêr is also the red in Masulipatam and many other palampores.

Morinda bark is used by the hill-people of the Goomsur maliahs of Ganjam for a red dye and is there called "achu."

Indigo is the common blue dye universally used in the plains, but *Wrightia tinctoria* is said to be used in the north of the Vizagapatam hill tracts for the same purpose. It is called "chittankudu."

The yellow of Masulipatam palampores is prepared from the leaf galls of *Terminalia chebula*. It is called "allikaya," or "aldikaya."

70. *Woollen Carpets.*—In the woollen carpets of Masulipatam and Ellore all the dyes are native and I did not discover any in which aniline dyes were used, but probably they may be found in some of the inferior small rugs, as is the case at Ayyampet in Tanjore.

The dyes most used are for crimson or red—stick lac and sappan wood (*Cœsalpinia sappan*) yellow, "*allikaya*" and turmeric, orange or reddish yellow ; the flowers of the Moduga tree (*Butea frondosa*) combined with turmeric ; dark and pale blue, indigo.

Other colours are produced by the combination of the above.

71. *Silk.*—In silk the most common dye is the crimson from stick lac. At Berhampore all cloths are of this colour unless specially ordered. At Jaggayapet a fine golden yellow, sometimes approaching to orange, is used. It is called "vangapandu chaya," and seems to be identical with the dye produced from *Rotlera tinctoria*. Black or dark-blue is prepared from indigo, but seldom to be got unless ordered. Green is imported. Various other shades and tints are produced by arranging the warp and weft in different colours.

72. Generally speaking in cotton, silk and wool the reds and blues are more or less permanent but the greens and yellows are fugitive. The pale-blue in old carpets is often only a faded green. It is necessary to bear this in mind in comparing the quiet tones of old carpets and other textiles with the extreme brilliancy of new ones.

## CONDITION.

73. *General.*—Except in carpets, palampores and some descriptions of cotton goods nearly all trade is local.

74. Carpets are exported to Europe and to various parts of the Presidency. Palampores are for the most part sent to Burma, the Straits and to Persia and other places *viâ* Bombay.

75. The coloured clothes of Chirala, Vetapálem, Pedana, and other places in Kistna are in demand among Mahomedans in the Northern Circars and in Madras, but the chief trade is with Hyderabad.

76. The common white cloths made in the Kistna and Godavari Districts are bought by merchants from Hyderabad, besides being sold in the districts.

77. In Rájam coloured cloths there is large trade with Nagpore and the hill tracts of Vizagapatam and Ganjam. Some of the finer white cloths of Uppada are sent for sale to Madras and other places, but with these exceptions the cotton weavers only supply the demand of the surrounding districts.

78. All export trade is in the hands of Sowcars, who supply the workmen with materials and pay them at fixed rates for each cloth and carpet, etc. When the orders of the Sowcars are insufficient, the weavers will do inferior work on their account for sale in the local bazaars and country fairs.

79. The inferior class of white cloths of country-spun thread are only made to order.

80. Goldsmiths, carpenters, muchies and blacksmiths only work on special order or for daily hire.

81. Brass-smiths like the weavers generally form a separate colony in certain towns and villages. A master workman, who employs others of his class, takes the place of the Sowcar and carries on the trade with the surrounding districts.

82. Unmarried men in every trade generally work for hire under members of their own family or trade. The better class of workman, when married, hires another to assist him unless there is an adult member of his own family following the same occupation.

83. The females of a weaver's, potter's and brass-smith's family generally assist in minor operations in which special skill is not essential.

84. In palampore printing and basket-ware, females sometimes carry out the whole work. Cotton is spun and wound almost exclusively by females.

No. 5(*d*). Industries in MADRAS, 1886.

85. *Relative condition as to numerical strength.*—The information on this head given in the census returns is, I think, not altogether reliable. These returns are drawn up in two forms; one is of little value, as the classification has no direct reference to the usual sub-divisions of labour recognised by natives and, if correct, many must be included in it twice or more under different heads. The other is more explicit except in one point, and that with regard to the female workers included in it.

86. According to these returns, in the Vizagapatam District there are 56,313 female weavers out-numbering the males by nearly 2 to 1; there are 1,255 female goldsmiths, 552 female blacksmiths and 587 female potters, etc.

Such statistics are misleading if not explained. The enumerators have evidently included as weavers, goldsmiths, etc., the wives and daughters of the actual worker who sometimes assist in minor operations. Thus the weaver's wife will wind the thread and assist in arranging the warp, the potter's wife beats the chatties when nearly dry with a kind of wooden mallet. This system of counting seems to leave considerable latitude to individual discretion, for even in adjacent taluks there is often an astonishing variation in the relative proportion of males and females engaged in the same work. Females, as a rule, never work independently. I have inspected many thousands of weavers at work at their looms, but never yet discovered a female worker actually engaged in weaving. I have seen a female brass-smith making ornaments for hill-people and occasionally females who undertook palampore work independently.

87. Analysing the returns for the Vizagapatam District without reference to females, I find in the plains the following approximate relative proportion of the chief handicrafts:—Brass-smiths 1, bamboo and basket-workers 1·2, blacksmiths 1·5, potters 2·2, carpenters 2·6, goldsmiths 5·5, and weavers 17. Except that the goldsmiths in this district are in larger proportion than usual, these figures agree with my own general notes and with some statistics I have obtained independently. They will, I think, represent tolerably accurately the normal relative strength of each of these industries.

88. Including females the proportions stand thus:—Brass-smiths 1, blacksmiths 1·5, basket and bamboo-workers 1·6, carpenters 2·7, potters 3·8, goldsmiths 5·5, weavers 43·9.

89. In the hill tracts it is said that females weave their own cloths. There the proportion is as follows:—

Including females, carpenters are lowest at 1, blacksmiths next in proportion 5·6, goldsmiths 6·5, potters 17·7, brass-smiths 24·7, and weavers 95·2.

90. Compared with the others those engaged in cotton printing, carpet-weaving, stone-cutting, bangle and toy-making, and in minor industries form a very insignificant fraction.

91. *Condition as to prosperity of trade—Cotton Weavers.*—With some few exceptions in every seat of the industry throughout these districts, there has been, according to all the evidence available, a steady and continuous decline in numbers. Perfectly trustworthy statistics are very difficult to obtain everywhere, but having heard the statements of the weavers in most of the towns and villages of nine districts and obtained as much independent testimony as possible, I think the following figures, taken from one of the towns in the Vizagapatam District, are trustworthy and typical of the average condition of the industry in white cloths, which forms the chief branch of native cloth manufacture:—

| | |
|---|---|
| Number of families of weavers at work . . . . . . . . . . . . | 110 |
| Number of families of weavers now engaged in other work . . . . . | 10 |
| Number of families who have left the place for want of work within the last four or five years | 15 |

92. Doubtless in many places the decrease is considerably greater in proportion, but it is sometimes compensated for by an increase in other places. Beyond four or five years back, the figures given would probably be only conjectural, but the weavers nearly always date the commencement of the falling off at about 20 or 30 years ago.

93. The decline in numbers is probably for the most part in the class of inferior workmen who weave the common white cloths of imported twist selling for 2 or 3 rupees each, for they have not only to compete with English and American long cloth, a piece of which, equal in length to a native cloth, can be purchased for less than half the price, but with machine-made cloths precisely similar to their own production as regards size, pattern, and quality of cotton, and selling for about three-fourths the price. The country weaver has, however, one advantage which the hand process gives him—his cloths are more durable and are sometimes preferred on this account to the cheaper machine-made cloths. Weavers of coloured cloths only have to compete with inferior imported printed cottons, and in the finer class of white cloths there is no direct competition with the native weavers, but they suffer indirectly from the cheapness of European long-cloth and change of habits among the higher classes of natives.

94. At Chirala and Vetapalem I was informed that, besides the ordinary native cloths described above, some ten or twenty years ago there was a large trade in a description of purdah or coloured hangings for export to Europe. Many families still retain the paper patterns which had been sent to them. The main part of this industry has disappeared; only one family now receives orders from a Madras firm. The native trade, both here and at Pedana and the other places where similar cloths are made, is also said to have declined considerably.

95. In very few places there has been an increase in numbers only attributable to the migration of weavers in search of work.

96. At Rajam, however, there seems to be some real increase of prosperity. The weavers have increased in numbers, they earn comparatively high wages and their cloths are in great demand in Nagpore and among the hill tracts of Vizagapatam and Ganjam. The special trade of Rajam seems to be out of the influence of the competition of foreign importations. The only class of goods which compete with native-coloured cloths for females are cheap printed cottons, and among the hill tracts especially the strength and warmth of the country cloth would be likely to establish a superior demand for them.

97. *Silk-weaving.*—The number of weavers of Jaggayapet is said to fluctuate considerably. Silk-weavers from Hyderabad will settle there for a time when they can find enough work and return when there is nothing for them to do. The weavers at Berhampore are said to be steadily decreasing.

98. *Carpet-weaving.*—Only within the last four years there has been a diminution in the total number of weavers employed, but the kharkhanas or houses of looms remain the same. The falling off is attributed to a decrease of foreign orders for large carpets. The commercial depression in Europe may be the cause of this.

99. *Cotton-printing.*—This industry seems to have declined perhaps more than any other. The evidence of the workmen is supported by disinterested testimony—the extraordinary number of blocks which being no longer wanted have been thrown on one side. In my last report I referred to a similar condition in the southern districts. At Masulipatam from one house I obtained impressions from over 200 disused blocks, each different in design, but all of one class of pattern—very simple repeats of flowers or spots. I think the fact that there should have been a demand for variety of such minute distinction and that one family of printers could afford to provide itself with such an extensive stock is remarkable evidence of the extent of their former trade. In several places, Vizanagram and Vizagapatam for instance, workmen who now print only common borders to white cloths have a large stock of blocks which are never used or only brought out when a special order is given.

100. The Masulipatam workmen, however, are well paid compared with the weavers. Probably they adapt themeselves to circumstances more easily. The weavers seem to have an almost invincible objection to any other occupation and will hold on to their looms as long as they can earn enough to provide themselves with scanty food.

101. *Paper Manufacture.*—The paper manufacture at Kondavid was said to have been much more important formerly than it is at present. I found ten families there who were provided with apparatus, but employed as coolies or agriculturists. Twenty years ago I was told there were about sixty families. Now there are only ten.

102. The relative prosperity of other industries may be estimated by comparing the earnings of workmen.

103. *Earnings of Workmen—Cotton Weavers.*—A single cooly weaver, *i.e.*, one who works under another, ordinarily receives Rs. 3½ or Rs. 4 per month according to his skill. It does not follow that the cooly is less skilful than the employer. Most unmarried men work for hire in this way. A cooly at Rajam and at Pandur and elsewhere weaving the finest cloths of country or foreign thread gets Rs. 5 or 6 per month. A weaver's family (man, wife and child), making the coarsest white cloths of country cotton will earn collectively on the average from 2 to 3 annas per day. They do not employ a cooly. A similar family of what I have called the second-class, *i.e.*, the great mass of the weaving industry engaged in making ordinary white cloths of imported twist, earns from 3 to 4 annas per day after paying the cooly. A family weaving the finest cloths of "silk-weaver's cotton" can earn from 5 to 7 annas per day besides paying for a cooly as I have mentioned above. This class of weavers is a very small fraction of the whole industry.

104. *Silk Weavers.*—A family earns on the average 4 or 5 annas per day.

105. *Carpet Weavers.*—Carpet weavers work together in large "kharkhanas" and are not assisted by the females of their families. They receive from 8 annas to 2 annas each man according to his skill.

106. *Cotton Printers.*—Cotton printers also work together like the carpet weavers and brass smiths. At Masulipatam the man who prints the cloths receives about 8 annas per day, the waxer 6 annas, and the dyer 3 annas. In other places their earnings are less in proportion to the quality of work.

107. *Goldsmiths.*—In proportion to their skill goldsmiths earn from 4 annas to Re. 1 per day.

108. *Brass-smiths.*—The earnings of brass-smiths are as follows: those doing cast work—skilled workman from 6 to 7 annas per day, others less in proportion to their ability. Those doing plain beaten work—skilled workman 4 annas to 5 annas, others in proportion.

109. *Carpenters and Blacksmiths.*—Ordinary carpenters earn from 2 to 3 annas per day each man. They also receive once a year remuneration in the shape of grain for repairing agriculturists' implements. Skilled carpenters and blacksmiths in large towns earn higher wages.

110. Goldsmiths are the most flourishing. A quantity of flimsy imitations in base metal of some of the commoner patterns of jewellery are now sold in the bazaars, but they are not likely to have had an appreciable influence on the native goldsmith's work. They are better paid than any other workman.

111. The cotton weavers are perhaps worse off than most others, for, though an ordinary carpenter or blacksmith receives no more than an average weaver, his wife and family are at liberty to work in the fields or as coolies and thus add to their earning, whereas a weaver's family is wholly occupied in giving assistance as preparatory work for the loom.

112. *Condition as to technique, etc.—Cotton weaving and spinning.*—In both one cannot fail to notice the extreme simplicity of the apparatus in use. However no very practical improvement in the looms has hitherto been effected which does not take from the weavers the very advantage (in point of durability) which the simple hand-process now enables their goods to hold in the market.

The direction in which they might perhaps receive an important benefit would be by the introduction of a more effective but simple hand-machine for spinning cotton which would combine the advantages of rapid production and evenness of thread of machine manufacture with the quality of strength which country cotton now has. If by this means the cost of production of country hand-spun cotton could be materially reduced, the weaver's position would probably be immensely improved for, whereas now he is obliged to purchase imported twist at bazar rates, he would then be able at first hand to obtain a material the quality of which would give his cloths a most decided advantage over those made of machine-spun thread.

No. 5(*d*). Industries in MADRAS, 1886.

Many attempts have been made to improve upon the primitive "gin" used by spinners in order that they might be able to prepare raw cotton for the home market, but I believe little has been done in the other direction to enable the weavers to supply themselves with cheaper material. At present a spinner of coarse cotton working the whole day can only produce 6 or 8 pies' worth, or if fine "silk-weaver's cotton," to the value of about one anna.

As far as the manipulative process is concerned and in his own class of goods, the native weaver is often a highly-skilled workman and little improvement is likely to be effected in this direction. The best cloths are well woven and far superior in quality to the ordinary machine-made cloths which are offered in the bazaars.

113. *Carpet weaving.*—The fact that the best description of English carpet is still made on identical principles is an acknowledgment of the efficiency of the process borrowed originally from Persia.

The ordinary Ellore and Masulipatam carpets of small size prepared for the country bazaars are often of inferior stuff and badly made; but carpets of the superior class prepared only on special order are equal in point of finish and material, and infinitely superior artistically to the imitations of them made in the various jails of the Presidency. There may be a falling off in treatment of colour and in the execution of the details of patterns compared with the *finesse* in the working of Indian carpets made 20 or 30 years ago, but the blame for this can hardly be attributed to the weavers themselves, and the mischief is not so serious but that a judicious encouragement of the weavers would soon remedy it. The best patterns in use are not inferior to those of old South Indian carpets which are held up to the disparagement of modern productions.

The outcry against the deterioration of Indian carpets, as far as Madras carpets are concerned, is, in my opinion, not altogether called for. Aniline dyes are very rarely used as they are at Warangal and other places in Hyderabad, and I have seen carpets from the native looms at the three seats of the industry—Ellore, Masulipatam and Ayyampet (Tanjore) which are in no respect inferior to old specimens in the hands of connoisseurs in London or in native houses and palaces.

I cannot but think that jail manufactures which are generally altogether inferior in colour and design are passed off as coming from the caste-weaver's looms. The good work to which I refer is not at all easy to obtain, and the unbusiness-like habits of ordinary native workmen doutless react against their trade. After a personal observation of the looms I think Madras carpet manufactures have not been adequately represented in the recent collections for exhibition, still less so at Calcutta in 1883-84. Without a good typical collection of all the various industries for reference it will be almost impossible for any committee in Madras to insure that every manufacture does itself justice.

114. *Cotton printing.*—As I have described above there are two processes—one by which the patterns are drawn and completed entirely by hand (except that the preparatory outline is sometimes stencilled), and another in which the greater portion of the work is accomplished by means of blocks. The first naturally has the most artistic capabilities, and in some cases, such as in the Pallacollu palampores, it has led to as close an approach to fine art as native ideas and a predilection for a flat treatment of design will permit.

The other process has also some advantages from an artistic point of view, but these very advantages have from commercial exigencies led to the chief defects in modern productions, *viz.*, the blurred outline and smudginess which are characteristic of ordinary Indian cotton printing. In the commoner cloths printed only in red on a white ground, these faults are not often noticeable and occur only from the use of worn-out or badly cut blocks or from careless printing. When a cloth is required to have two colours, generally red and blue, the dye is first applied by means of blocks in the ordinary way, the colour being brought out by boiling the cloth, but in all cases the second colour (blue) must be added afterwards entirely by a method which is practically hand-painting. In cloths prepared for the ordinary market it is impossible for the workmen to compete with cheap imported printed cottons and at the same time attend to the niceties of execution which this hand-painting demands. In the modern European process the whole work is, of course, performed more rapidly by machinery, but tedious and primitive though it may seem compared with mechanical production, it is obvious that the native method has considerable artistic advantages, and to these advantages Masulipatam palampores owe most of their beauty.

115. *Goldsmiths.*—Goldsmiths as a rule prepare nothing beyond the personal ornaments in gold or silver worn by natives (chembus, rose-water sprinklers,and other vessels of gold or silver are generally made by brass-smiths or by workmen of the goldsmith's caste who work exclusively in such articles). The defects in their work are chiefly a neglect of general finish and a want of precision in the making of joints, hinges, or other fastenings. Such defects are by no means common to the goldsmiths as a class, and I have found many in whose work the defects were insignificant compared with much that was truly excellent. The art of working in precious metals is, expressing it briefly, to put work into them, *i.e.*, to give the maximum of thoughtful labour to the minimum amount of precious metal consistent with considerations of utility. This the native goldsmith clearly appreciates and in such correct use of gold and silver for the purpose of ornaments, in good feeling for decorative design, and in careful finish of ornamental detail the best goldsmiths might teach a lesson to the majority of their European fellow-workers of the present time. There are no important processes (except purely mechanical processes of modern introduction) which are unknown to them. Inferior goldsmiths are finnikin in their work, but this is a fault common to all unskilled designers, and occasionally the designs of otherwise skilful workmen have a tendency to the extravagant ornamentation and elaboration for its own sake which have ruined Madras and Trichinopoly gold and silver work. Usually, however, their design is purer in style and more vigorous than is commonly found in other districts. In the Vizagapatam District especially I found better work than any I have seen in any other parts of the Presidency.

116. *Jeweller's work.*—It is impossible to draw any comparison between Indian and modern European jeweller's work. The two are quite distinct in principle. The native workman treats precious stones entirely for the artistic effect he can produce with them; the European chiefly regards them for their intrinsic value and beauty. Considered from his own point of view the native can produce excellent results; though, doubtless, it would be no loss to the effect if the stones were more carefully worked. Jewellers do not generally understand lapidary's work. They obtain the stones ready-cut for setting.

117. *Silversmiths.*—The silver and gold work which ordinary brass-smiths do is rough and plain, but among the few of the goldsmith's caste, who for the most part confine themselves to silversmith's work, there are workmen whose productions are exceedingly well made and finished. Work of this description is nearly always hammered throughout, moulding being very seldom employed.

In design of silver and gold work on the large scale required in this branch of the craft, the Madras workman is not generally so successful as in jewellery. He neglects the relative importance of the various parts, and in proportion to his desire to produce a *chef d' œuvre* or to please his patron, he overcrowds and elaborates the ornamentation, so that the effect of the whole is altogether inadequate with the patience and skill bestowed on the detail. The best work consequently is produced when the desire for display is subordinate to considerations of utility or when the patron cannot afford to pay for extravagant excess in ornamentation.

118. *Brass-smiths.*—The best workmen are skilful in the use of their tools, and their work is generally well finished. They are, however, with very few exceptions, ignorant of the European method of casting in sand, etc., which would be employed with great saving of labour in some portions of their work. They use the wax process already referred to for all kinds of castings. It is hardly necessary to say that they are unacquainted with the method of spinning.

The large bronze lamps for temples are often good in design. Other ornamental work is seldom attempted by an ordinary brass-smith.

119. *Ivory Carvers.*—In methods of execution there is nothing particularly note-worthy nearly all ivory work is well finished and executed with considerable skill. In design little can be said in praise of it. Most Vizagapatam work has nothing except the careful execution to redeem its artistic wretchedness. The general treatment borrowed from metal work is altogether unsuited to the nature of ivory, the carved ornamental details are feeble and monotonous, and the etchings mostly copies of the worst European patterns. The attempt to conceal the construction by placing ivory knobs on the head of each rivet is characteristic of the general ignorance of design displayed throughout.

Good work both in design and execution may be obtained from the ivory carvers in more remote parts of the Vizagapatam and Ganjam districts, but these men only work to special order.

The workmen employed by various Zemindars and Rajas are generally very skilful, but in compositions on a large scale they fall into the same error as the silversmith.

120. I append a list of all the places in the four districts in which any industry of importance is carried on, and also a few notes regarding prices.

## APPENDIX.

| Place. | Number of families. | | | | | | | Other particulars. |
|---|---|---|---|---|---|---|---|---|
| | Cotton weavers. | Goldsmiths. | Carpenters. | Brass-smiths. | Blacksmiths. | Potters. | Muchies. | |
| *Kistna District.* | | | | | | | | |
| Ayyanvole . . . | ... | ... | ... | ... | ... | ... | ... | Thirteen families engaged in making reed mats; four of them will make ornamental patterns, if ordered. |
| Addipallee . . .<br>Bhattiprolu . . . | 110<br>110 | ... | ... | ... | ... | ... | ... | *Weavers.*—Coloured dhotis and handkerchiefs for Mahomedans, similar to those of Chirala and Vetapálem. |
| Chirala . . .<br>Vetapálem . . . | ...<br>... | ... | ... | ... | ... | ... | ... | *Weavers.*—Coloured dhotis for Mahomedans of a deep red colour with a white stripe on each border. Handkerchiefs with checked patterns for the same. |
| Casenapully . . . | ... | ... | ... | ... | ... | 2 | ... | Two potters make rough kujas, etc., of a clay which is superior to what is generally used. |
| Durgi . . . | 22 | 9 | 5 | 3 | 3 | 9 | ... | Brass-smiths make brass and copper images. Two stone-cutters carve images. |
| Guntúr . . . | 100 | ... | ... | ... | ... | ... | ... | *Weavers.*—Coarse white cloths. Ten families tan and dye leather for book-binding, etc. A few ordinary goldsmiths, brass-smiths, and carpenters. |
| Idugallapalli . . .<br>Kappaladoddi . . .<br>Mallavolu . . . | 40<br>50<br>30 | ... | ... | ... | ... | ... | ... | Ordinary native cloths; ten families at Idugallapalli, seven at Kappaladoddi and five at Mallavolu weave cloth for European wear. |
| Jaggayapet . . . | 71 | 31 | 46 | 7 | 15 | 23 | 2 | *Cotton weavers.*—Ordinary white cloths. Thirty-one families of silk weavers, five silk cloths and cholis; also seventeen families weaving coarser cloths of tasar silk; seventeen families of cotton printers; inferior work in women's cloths, borders to white cloths, etc.; eighty families of stone-cutters. |
| Kondapilly . . . | 80 | 30 | 40 | 5 | 15 | 25 | 30 | *Weavers.*—Plain white cloths. Muchies, about twenty, paint and decorate bedsteads, palanquins and boxes, and make large wooden figures for Hindu cars, painted and gilded; ten houses are engaged in making toys, chiefly small figures from a very light wood (*Gyrocarpus Asiaticus*); one man stamps leather for boxes, desks, and book-binding. He has only two patterns. |
| Kondavid . | | ... | ... | ... | ... | ... | ... | Ten families making a coarse kind of paper; twenty families distil scent from jessamine. |

NOTE.—The numbers given are approximately correct, but are not in all cases to be taken as precise statistics. They are intended to show the relative importance of the various places with regard to each industry.

| Place. | NUMBER OF FAMILIES. Cotton Weavers. | Goldsmiths. | Carpenters. | Brass-smiths. | Blacksmiths. | Potters. | Muchies. | Other particulars. |
|---|---|---|---|---|---|---|---|---|
| *Kistna District*—contd. | | | | | | | | |
| Macherla | 49 | 6 | 1 | ... | 2 | 5 | ... | *Weavers.*—A few families make a stout cotton cloth in narrow lengths which are sewn together to serve as screens or to make a superior kind of bag. If desired an ornamental effect is produced by dyeing the lengths alternately red or blue. The cloth is sent to Nadukudi near Dachepalle to be dyed. |
| Masulipatam | 84 | 68 | 36 | 16 | 35 | 23 | 35 | *Weavers.*—White checked cloths for females, ordinary white cloths. One hundred and forty-five families of Palampore printers; three families make hand-painted screen cloths or canopies on order; eighteen families of carpet weavers. |
| Mylaveram | 25 | ... | ... | 100 | ... | ... | ... | *Weavers.*—Common white cloths. Brass-smiths, four families making bell, chembus, etc. (cast work), the remainder plain beaten work. |
| Narsaraopet | 24 | 12 | 2 | 15 | 8 | 6 | 1 | Coarse cloths of country thread. One goldsmith, a skilful workman, making good silver belts. |
| Núzvíd | 4 | 10 | 10 | 4 | 1 | 5 | 3 | Two brass-smiths work fairly well in silver; three carpenters also work in ivory and make musical instruments and inlay ebony and ivory on a peculiar kind of white jungle wood, chiefly for sandals and boxes. The blacksmiths and carpenters use country iron obtained from hills near Somavaron, a village near Núzvíd. |
| Pedana | 400 | ... | ... | ... | ... | ... | ... | *Weavers.*—Coloured dhotis for Mahomedan's and women's cloths, common striped or checked patterns. Three families at Pedana and ten at Polavaram weave table-cloths and cotton cloth for European wear. |
| Polavaram | 120 | ... | ... | ... | ... | ... | ... | |
| Razapet | 106 | ... | ... | ... | ... | ... | ... | *Weavers.*—Coloured dhotis and handkerchiefs, similar to those of Chirala and Vetapálem. |
| Répalle | 80 | ... | ... | ... | ... | ... | ... | *Weavers.*—Ordinary white cloths. |
| Tenali | 220 | 10 | ... | ... | 4 | 10 | ... | *Weavers.*—Ordinary white cloths. |
| Vinukonda | ... | ... | ... | ... | ... | ... | ... | One family making cotton carpets. |
| *Godávari District.* | | | | | | | | |
| Cocanada | 28 | 43 | 40 | 11 | 25 | 5 | 6 | *Weavers.*—Ordinary white cloths. One skilled brass-smith making good ornamental lamps. Thirty-five houses of Palampore printers making common block-printed palampores and inferior hand-painted canopies with mythological figure subjects. |
| Jagannadapuram | ... | ... | ... | ... | ... | ... | ... | |
| Ellore | 700 | 250 | 225 | 25 | 100 | 150 | 25 | *Weavers.*—Fine white cloths with silver brocade and common cloths. Twenty-five houses of carpet weavers employing about one hundred weavers; thirty families of shoe makers; ninety of bamboo and basket workers. |
| Senivarapupeta | ... | ... | ... | ... | ... | ... | ... | |
| Gollapalem | ... | ... | ... | ... | ... | ... | ... | *Palampore printers; ordinary block-printed canopies, etc. One or two families inferior hand-painted canopies with mythological figure subjects. |
| Narsápur | 100 | 25 | 10 | 1 | 10 | 10 | 4 | *Weavers.*—Fine and inferior white cloths and inferior coloured cloths. Muchies painting figures for Hindu cars and making lacquered toys, boxes, etc.; fifty houses of palampore printers, common block-printed palampores and canopies on white ground. |
| Pallacollu | 100 | 4 | 2 | 3 | 3 | 4 | ... | *Weavers.*—Fine and inferior white cloths and inferior coloured cloths. Fifteen houses of palampore printers, generally women's cloths coloured, turbans and canopies, etc.; one particularly good workman painting canopies, etc., by hand, Hindu mythological subjects, "tree of life" patterns, sometimes with gold leaf to heighten the effect. |
| Peddápuram | 260 | 62 | 44 | 26 | 12 | 32 | 3 | *Weavers.*—Common white cloth. One silk weaver making a kind of silk gauze or muslin worn on ceremonial occasions by wealthy people; ends of the cloth brocaded; one specially skilful goldsmith doing jeweller's work; one skilled brass-smith making images and vessels in bell-metal; one hundred and fifty families of stone masons. |
| Pithápuram | ... | ... | ... | ... | ... | ... | ... | A few weavers of common white cloths; one good silversmith. |
| Rajahmundry | 97 | 300 | 700 | 100 | 75 | ... | 3 | *Weavers.*—Coarse white cloths. Carpenter's boxes, bedsteads, etc., four hundred families; common wood-work for houses, three hundred families. |
| Tuni | 300 | 15 | ... | ... | ... | ... | ... | *Weavers.*—About fifty families weaving fine white cloths; a few muslin cloths of "silk-weaver's cotton," the rest common white cloths. |
| Uppada | 200 | ... | ... | ... | ... | ... | ... | *Weavers.*—Mostly fine white muslin cloths with silk borders, some of "silk weaver's cotton." There are some fifty families of weavers at and near Uppada who spin "silk-weaver's cotton." |

NOTE.—The numbers given are approximately correct, but are not in all cases to be taken as precise statistics. They are intended to show the relative importance of the various places with regard to each industry.

* Number not returned up to date.

| Place. | Number of Families. | | | | | | | Other particulars. |
|---|---|---|---|---|---|---|---|---|
| | Cotton Weavers. | Gold-smiths. | Carpenters. | Brass-smiths. | Black-smiths. | Potters. | Muchies. | |
| *Vizagapatam District.* | | | | | | | | |
| Allipore | 50 | ... | ... | ... | ... | ... | ... | Women's coloured cloths similar to those of Rájam, coloured turbans, white cloths, both fine and inferior, bed-ticking and similar cotton cloths. |
| Anakapáli | 110 | 15 | 15 | 30 | 15 | 20 | ... | *Weavers.*—White cloths, both fine and inferior. A few families using "silk-weavers' cotton;" one exceptionally good gold-smith can damascene on iron and steel; one tin-worker (cast vessels); brass-smiths, common beaten work. |
| Bobbili | 175 | 10 | ... | 30 | ... | ... | ... | *Weavers.*—White cloths, mostly inferior. One gold-smith can damascene on iron and steel; twenty stone-cutters; two good carvers. |
| Boddam | 25 | ... | ... | ... | ... | ... | ... | *White cloths.*—A few looms weaving fine cloths of "silk-weavers' cotton." |
| Jamee | ... | ... | ... | ... | ... | ... | ... | Thirty-five families weaving cotton carpets. |
| Nakkapilli | 60 | ... | ... | ... | ... | ... | ... | *Weavers.*—Common white cloths. One family doing lacquer work on toys, boxes, bedsteads, etc. |
| Kotapadu | ... | ... | ... | 150 | ... | ... | ... | Nearly all plain beaten work; one makes good ornamental lamps for temples. |
| Kudur near Kotapadu | ... | 4 | ... | ... | 4 | ... | ... | *Black-smiths.*—Making bandymen's knives, writing styles, razors, etc.; formerly making spears and swords; one man received an award for good work at the International London Exhibition of 1871. |
| Pandur | 400 | ... | ... | ... | ... | ... | ... | Fine white cloths with silver lace and embroidered borders (mixed silk and cotton); inferior cloths; fine muslin cloths of "silk-weavers' cotton" (about fifty families); about one hundred houses also spin "silk-weaver's cotton." |
| Parvatipur | 40 | 22 | 15 | 75 | 10 | 25 | ... | *Weavers.*—Inferior white cloths. Brass-smiths, about fifty families of master workmen who employ the rest to work under them; about twenty-five families working in bell-metal; twenty-five in beaten work. |
| Pedapenki | ... | 9 | ... | ... | ... | ... | ... | *Gold-smiths.*—Two specially skilled workmen who make excellent girdles in gold or silver. |
| Penubaka | 20 | ... | ... | ... | ... | ... | ... | *White cloths.*—A few looms weaving fine cloths of "silk-weaver's cotton." |
| Rájam | 800 | 20 | 15 | 5 | 10 | 12 | 5 | *Weavers.*—Fine coloured cloths with wide embroidered borders, sometimes with silver lace, white cloths of the same description; two silver-smiths, one an exceptionally good work-man. |
| Srípuram | 40 | ... | ... | ... | ... | ... | ... | *White cloths.*—A few looms weaving fine cloths of "silk-weaver's cotton." |
| Srungavarupukota | 50 | ... | ... | ... | ... | ... | ... | *Weavers.*—Common white cloths. One family of four brothers doing plain lacquer work on toys, bedsteads, etc. |
| Vizagapatam | 300 | 200 | 70 | 30 | 50 | 30 | 1 | *Weavers.*—Common white cloths. About ten gold-smiths, specially skilful workmen; one brass-smith makes good lamps and vessels in bell metal; four houses of Palampore printers, one with a number of old Persian patterns, ordinary work, simple borders to cloth: nine large houses of ivory workers employing about fifty workmen. |
| Vizianagram | 100 | 95 | 43 | 30 | 26 | 9 | 8 | *Weavers.*—Mostly white cloths, both fine and inferior. A few looms fine muslin cloths of "silk-weavers' cotton" with ornamental borders of mixed silk and cotton. Many weavers out of work. Gold-smiths, about twenty families, confine themselves to jeweller's work; one gold-smith exceptionally good workman; four families of cotton printers generally doing inferior work, such as borders to cloths; one has a large quantity of blocks but seldom used; about twenty-five families of shoe-makers prepare leather for book-binding, etc., coloured red, blue or yellow. *Maharajah's Industrial School.*—Pottery, rattan work, coarse carpets (cotton and wool), silk weaving, embroidery, musical instruments, etc. |
| *Ganjam District.* | | | | | | | | |
| Antagudda | ... | ... | ... | ... | ... | ... | ... | One gold-smith carving fruit shells. |
| Berhampore | 355 | 83 | 42 | 8 | 48 | .. | 1 | *Weavers.*—White cloths. A few looms fine cloths of "silk-weavers' cotton." Seventy-five houses of silk weavers, fine coloured cloths and cholis; one tailor doing inferior embroidery work. |
| Boodethy | 150 | ... | ... | ... | ... | ... | ... | *Weavers.*—Fine and inferior white cloth. Fine muslin cloths of "silk-weavers' cotton" (about five families). |
| Belugunta | 30 | 5 | 4 | 10 | 4 | 2 | ... | *Weavers.*—Coarse white cloths. Brass-smiths (five houses) make ornaments worn by Uriyas; five make bells, paudams, chembus, etc., besides ordinary beaten work; two workmen fairly skilled in silver-smith's work. |

NOTE.—The numbers given are approximately correct, but are not in all cases to be taken as precise statistics. They are intended to show the relative importance of the various places with regard to each industry.

No. 5(*d*).
Industries
in MADRAS,
1886.

| Place. | Number of families. | | | | | | | Other particulars. |
|---|---|---|---|---|---|---|---|---|
| | Cotton Weavers. | Gold-smiths. | Carpenters. | Brass-smiths. | Black-smiths. | Potters. | Muchies. | |
| *Ganjam District*—contd. | | | | | | | | |
| Chikati (employed by the Zemindar). | ... | ... | ... | ... | ... | ... | ... | One good ivory-carver; one embroiderer making State Umbrellas, canopies, etc., in a kind of patch-work and applique work. |
| Chicacole . . . | 100 | 32 | ... | 6 | ... | ... | ... | *Weavers.*—Fine and inferior white cloths. Fine muslin cloths of "silk-weavers' cotton;" also muslin with checked and flowered patterns in coloured cotton used by Mohamedans for jackets, turbans, etc., also by European ladies for dresses (about five families); light cotton cloth for European wear (one family); two gold-smiths also carve stone and one can damascene on iron and steel. (The numbers of carpenters, black-smiths, etc., not exactly known.) |
| Ichápur . . . | 40 | 16 | 4 | ... | 4 | 2 | ... | Weavers of white cloths, both fine and inferior. Fine muslin cloths of "silk-weavers' cotton" (about five families). |
| Mandasa . . . | 50 | 10 | 4 | 1 | 3 | 2 | ... | Weavers of white cloths, both fine and inferior. Fine muslin cloths of "silk-weavers' cotton" (two families); one gold-smith can do damascene work on iron; two stone-carvers. |
| Employed by Zemindar. | ... | 5 | ... | ... | ... | ... | ... | One gold-smith particularly excellent workman; two of them carve ivory and cocoanut and bale fruit shells very finely; one painter doing fine lacquer work; three skilful stone-carvers; one embroiderer in silk on cloth work very bold in design, and particularly good in execution. |
| Muttoora . . . | ... | ... | ... | ... | ... | ... | ... | About fifty houses of stone-cutters, twenty five good carvers. |
| Narsipettah . . . | 250 | ... | ... | ... | ... | ... | ... | *White cloths.*—A few looms weaving fine cloths of "silk-weaver's cotton." |
| Palasa . . . . | 40 | ... | ... | .. | ... | ... | ... | Weavers of white cloths, both fine and inferior. Fine muslin cloths of "silk weavers' cotton" (two families); three houses of ivory carvers, also making musical instruments and horn boxes and combs; ornamentation produced by incisions with a composition of silver and mercury rubbed into them. |
| Parlákimedi . . . | 70 | 22 | 20 | 1 | 8 | 20 | 20 | *Weavers.*—Coarse white cloths. One carpenter a skilful ivory carver, but not regularly employed; the muchies are employed in decorating the palace; a female brass-smith making ornaments for the hill-people; four families of basket workers making ornamental mats and fancy baskets, etc.; potters on order will make large jars up to four or five feet in height for storing grain. |
| Tarlá . . . . | 70 | 6 | 2 | 4 | 2 | 2 | ... | *Weavers.*—Coarse white cloths. |

NOTE.—The numbers given are approximately correct, but are not in all cases to be taken as precise statistics. They are intended to show the relative importance of the various places with regard to each industry.

*Prices.*—A few notes regarding the prices of various articles may be useful.

The cloths of Chirala and Vetapálem dyed with "Seruvêr" sell at from Rs. 2-8-0 to Rs. 3-8-0 each, or Rs. 4 to Rs. 6 per pair according to the fineness of the colour.

Rájam coloured cloths vary greatly in price; according to the fineness of the thread or quantity of lace, from 2 to 25 rupees each.

Chicacole muslin (with coloured spots or stripes) is ordinarily made of three qualities. One piece 12 yards long and 1 yard wide if of English thread sells at Rs. 6, Rs. 5, and Rs. 4-8-0 according to the fineness of the thread. A similar piece woven with country thread costs Rs. 10, 9 or 8. When specially ordered cloths of extra fineness are made of country thread costing up to Rs. 25.

The thin cotton cloth for European wear made at the same place sells at from Rs. 1-12-0 to Rs. 2-4-0 per piece of $10\frac{3}{4}$ yards.

Silk weaver's thread is ordinarily spun in three degrees of fineness, about equal to Nos. 60, 80, and 100 of European twist. It is sold by weight. Five, eight, or twelve tolas sell for one rupee. Extra fine thread selling at 2 tolas per rupee will be spun to order.

*Silk cloths.*—These are sold by weight. One seer for Rs. 8 to Rs. 13 according to the quality of silk. One man's or woman's cloth is 7 yards long and $1\frac{1}{2}$ wide and weighs about 2 or $2\frac{1}{4}$ seers.

Woollen carpets sell at from Rs. 4 to Rs. 10 per square yard according to quality and intricacy of the pattern.

*Brass and Bell-metal work.*—Plain hammered work of brass is sold by weight at $3\frac{1}{4}$ to 5 seers for one rupee.

Ornamental hammered work of brass, such as large temple lamps at $1\frac{1}{2}$ to 2 seers for one rupee.

*Bell-metal.*—Chembus and other vessels cast in bell-metal 1¾ seers for one rupee. (Hammered work in bell-metal is rather unusual. Some of the common utensils for the Brinjaris and hill-people are made in this way at Parvátipur.)

Kondavid paper is sold by the workmen for Rs. 10 per 100 quires.

## (e).—Order of the Madras Government on Mr. Havell's second report.

ORDER—dated 11th August 1886, No. 695, Revenue.

His Excellency the Governor in Council has perused this excellent report on Mr. Havell's tour in the northern districts with much interest. Further inquiries should be made regarding the superiority of the thread known as "silk-weavers' cotton" over the machine-spun imported thread (paragraph 15). Mr. Havell should obtain samples of the threads and of the cloths made with them and should consult Native and European experts on the subject. In submitting to Government the results of his inquiries he should also forward the samples.

2. The remarks in paragraph 113 regarding the carpets manufactured in jails will be communicated to the Judicial Department. It is observed that Mr. Havell admits in his recent note on Madras carpets that no aniline dyes are used in the Madras jails.

## (f).—Third report by Mr. Havell on the industries of Madras.

From E. B. HAVELL, Esq., Superintendent, School of Arts, on Special Duty, to the Secretary to the Commissioner in the Department of Revenue Settlement Land Records and Agriculture, dated Madras, 20th April 1887, No. 46 :—

With reference to G.O., Revenue, dated 25th January 1887, No. 86, I have the honour to submit report on the arts and manufactures carried on in the districts of Cuddapah, Kurnool, Bellary and Anantapur.

2. *Cotton-weaving—Coloured cloths.*—There is a considerable industry in coloured cloths for female wear carried on chiefly in the Bellary and Anantapur districts. The cloths are of an ordinary kind worn by the lower castes with common check patterns. The better sort have silk borders. Excepting the dark-blue (indigo) coloured cloths, they are invariably made of European coloured thread. The common cotton cloths vary in price from Rs. 3 to 4 each. Mixed silk and cotton cloths or cotton cloths with silk borders from Rs. 7 to 15 each, according to the quality of the silk used.

*White cloths.*—Fine white cloths with brocaded ends are made only at Pullampet (Cuddapah district) and the surrounding villages. They are of superior quality and wellwoven. European thread is always used. The industry seems to be flourishing. The price of the cloths varies greatly according to the amount of silver lace or brocade. Weavers of coarse white cloths worn by agriculturists are scattered in many villages throughout the districts. Country thread is generally used. These cloths are preferred to European long cloth by the agriculturists on account of being more durable and warmer. The demand is uncertain and the weavers very poorly paid.

*Cotton carpets.*—Cotton carpets are made at Cumbum and Kurnool in the Kurnool district and at Bellary and Adóni. The Cumbum carpets are well designed and good in colour, but rather coarsely woven. Country thread is used. There is only one family employed at Bellary, but good work is turned out. The designs and execution are very good as a rule, and when native dyes are used the colours are pleasing and fairly permanent. Carpets of large size are made to order At Adóni and Kurnool over 500 families are employed. All the best woven carpets are spoilt by the glaring colours of the European thread which are generally arranged in violent contrast to obtain the maximum of "effect." The European dyes are used. First, because the native purchasers prefer glaring colours ; and secondly, because they are less expensive and more easily prepared than the native dyes. The latter when carefully prepared are more permanent. European thread is used at Bellary, Adóni and Kurnool for the finer carpets. At Cumbum only country thread is used.

*Cotton-spinning.*—Only coarse thread is spun for the common white cloths worn by the agriculturists and for cotton carpets. Spinning, however, is not followed as a regular occupation; the females of a weaver's or agriculturist's family employ their spare time in spinning whatever is required for their own use.

3. *Silk-weaving.*—Fine silk cloths are made at the places noted in the margin. The industry is in a very depressed condition. The total number of families engaged in it is very small, and the finer cloths are only made to order. The depression is attributed chiefly to the rise in the price of silk owing to disease among the silk worms in Mysore. Three varieties of cloth are made. At Kurnool one family makes fine pagidees or turbans worn by Mahomedans. They are generally plain white with the ends brocaded in simple bands.

| | |
|---|---|
| Kurnool. | Bachigandanhalli. |
| Bellary district— | Tambrahalli. |
| Adóni. | Humpasagra. |
| Bellary. | Anantapur district— |
| Kampli. | Dharamavaram. |

No. 5(*f*). Industries in MADRAS, 1887.

The silk weavers at Bachigandanahalli, Tambrahalli and Humpasagra make mostly coloured silk cloths for cholis. The patterns are good, but the effect is generally spoilt by the use of crude imported green, purple or yellow which are quite out of harmony with the low-toned native crimson (lac) dye. The more harmonious country green and yellow dyes are rarely used except when specially ordered.

Dharmavaram in the Anantapur district and Kampli in Bellary are the chief places where fine cloths for female wear are made. At Kampli the weavers only work to order. The most effective and characteristic cloth is one with a white ground of a wide check pattern, crimson borders and brocaded ends, sometimes with figures of flowers, birds, etc. The best of this kind are made at Dharmavaram. At Kampli some handsome cloths are made of the same style with the ends prettily embroidered in various simple patterns.

*Dyes.*—For silk the dyes in common use are: crimson, lac or cochineal; yellow, turmeric various shades of orange, arnotto (prepared from the seeds of *Bixa Orellana*) used alone or together with turmeric, black from iron, more rarely a rich green, indigo and turmeric, when ordered a blue from indigo. Three very crude European dyes are also commonly used everywhere—a yellow green and purple. The contrast of these with the low-toned native crimson or orange is painful. The native dyes are not only more harmonious, but more lasting. I forward small samples* of yellow and green silk for comparison.

* Four samples.

*Prices.*—Silk cloth for cholis is generally made in lengths sufficient for six or more. Each choli is about three-fourths of a yard in length and costs from Re. 1 to Rs. 2-8-0 according to the pattern and quality. The price of the fine silk cloths of Dharmavaram and Kampli is estimated by the value of the silk and silver brocade and by cost of labour. A superior cloth will contain about three seers of silk costing from Rs. 7 to 9 per seer. The value of the brocade depends entirely on the width. The cost of labour for the body of the cloth will be about Rs. 6 or 7 and for the brocaded ends Rs. 8 to 12 according to the pattern. A cloth with elaborately brocaded ends will take as long as six weeks in execution.

4. *Printed cottons.*—The industry is carried on at the places noted in the margin. The Jammalamadugu chintzes are very inferior turbans for Mahomedans roughly printed with the simplest patterns on a black ground. The Pamidi and Cholloor cloths are mostly roughly printed handkerchiefs and turbans, but a rather effective screen cloth or purdah used in marriage ceremonies is also made. This is well printed and tastefully designed. One man at Pamidi and one at Cholloor prepare hand-printed cloths with mythological subjects similar to those made at Kálahasti and elsewhere. The handkerchiefs and turbans made at Banganapalle are rough, but on the coarse country cloths the patterns are sometimes effective.

Jammalamadugu (Cuddapah district).
Banganapalle and Nandyal (Kurnool district).
Cholloor and Pamidi (Anantpur district).

5. *Gold and silver-smith's work.*—There is nothing specially noteworthy in these districts.

6. *Brass-smiths.*—There are few brass-smiths and none specially skilful.

7. *Black-smiths.*—Very rough work as in other districts.

*Wood-carving.*—There is some good wood-carving to be found in various parts of the Bellary district, though little of it is modern. The best work is noticeable for the absence of the extravagance which generally disfigures characteristic Madura carving. In design and technique it somewhat resembles northern work. A very good old example of it now in the Central Museum was procured by the Collector for the Indian and Colonial Exhibition. There are now a few good workmen at Adóni and at Kampli. In design the Adóni carving is much the best; but the Kampli men are rather better carvers.

9. *Lacquer work.*—Very fine lacquer work on trays, fans, boxes, etc., is done at Nandyal and Banganapalli in the Kurnool district by two families. It is equal, if not superior, to any other Indian lacquer. This is a very effective and comparatively inexpensive form of decoration which if brought into notice and skilfully adapted to furniture and interior decoration might become popular. The process is similar to that of the Mandasa lacquer described in my last report, except that the composition for raising up the ornament is made from a white shell found in the river beds, which is finely ground up and mixed with white dammer. The Nosam lacquer work is similar in style, but much inferior both in design and execution. Some very inferior lacquer work is done in Kurnool town.

10. The particulars given in my last report with regard to the condition, etc., of the various industries apply to these districts also. I append a detailed statement of the towns and villages showing the number of workmen and the industries carried on.

## ENCLOSURE No. 1.

| Place. | Number of Families. | | | | | | Other particulars. |
|---|---|---|---|---|---|---|---|
| | Weavers. | Gold-smiths. | Carpenters. | Brass-smiths. | Black-smiths. | Potters. | |
| *Cuddapah district.* | | | | | | | |
| Chitvèl | 20 | 5 | 2 | ... | 2 | 7 | One family of muchis painting palmyra leaf fans, planquins, etc.; inferior to similar work done at Nosam and elsewhere. |
| Deverspully, Wattaloor | ... | ... | ... | ... | ... | ... | A few families making ordinary grass mats. |
| Cuddapah | 44 | 65 | 25 | 6 | 12 | 5 | |
| Gopagudipallu, Sompallee, Parnapalee | ... | ... | ... | ... | ... | ... | A few families making common grass bangles. |
| Jammalamadugu | 80 | 6 | 3 | ... | 1 | 15 | *Weavers.*—Coarse white cloths and turbans. One hundred families of cotton printers making rough turbans, etc. |
| Pullampet, Nagarajapet and surrounding villages. | 200 | ... | ... | ... | ... | ... | Fine white cloths with brocaded ends. |
| Ràyachòti, Ghanlvaid and many other places | ... | ... | ... | .. | .. | ... | A few families of weavers making coarse white cloths of country or English thread. |
| Rámesvaram | 60 | 6 | 2 | 3 | 2 | ... | Brass-smiths making lamps, chembus, etc., of an ordinary kind. |
| Wonypenta | ... | 4 | 1 | 151 | 1 | . | |
| *Kurnool district.* | | | | | | | |
| Banganapalle | ... | ... | ... | ... | .. | ... | One family painting trays, etc., with very good lacquer work. Seventy families of cotton printers, turbans, handkerchiefs, etc.; only 20 families regularly employed. |
| Cumbum | 50 | 12 | 12 | ... | 1 | .. | *Weavers.*—Coarse white cloths; 12 families of cotton carpet weavers. |
| Goorakul | ... | ... | .. | ... | .. | ... | A few families making common grass mats. |
| Kurnool | 36 | 30 | 31 | 4 | 12 | 9 | One weaver making fine silk brocaded turbans. Eleven families of muchies making lacquered images, toys, etc. One man damascening on steel and carving in wood. Two hundred and six families weaving cotton carpets. |
| Nandyàl | 204 | 11 | 7 | 1 | 6 | 3 | *Weavers.*—Common white and coloured cloths; one family doing good lacquer work as at Banganapalle. Thirty-two families of cottòn printers; rough handkerchiefs, turbans, etc. |
| Nosam | 20 | 3 | 1 | .. | 2 | ... | *Weavers.*—Coarse white cloths of country thread. Two families painting trays, boxes, fans, furniture, etc., with lacquer. Four families making painted wooden images, toys, etc. |
| Yelagode | ... | ... | ... | ... | ... | .. | Two families of fairly good wood-carvers. |
| Rudraveram, Chintacunta, Bachipalle, Srirungapuram | ... | ... | ... | ... | .. | ... | Villages in the Sirvel taluk where country iron is smelted. |
| *Bellary district.* | | | | | | | |
| Adóni | 700 | 10 | 28 | 5 | 15 | 10 | *Weavers.*—One or two families making fine silk cloths to order. The remainder common coloured cotton cloths with silk borders or mixed silk and cotton cloths. One hundred families of cotton carpet weavers. Two of the carpenters good wood-carvers. Eight families of muchies; 60 families of dyers. |
| Bachigandanahalli | 200 | 3 | 2 | ... | ... | 5 | *Weavers.*—One or two families fine silk cholis. Two hundred families mixed silk and cotton cloths or cotton cloths with silk borders. |
| Bellary | 300 | 150 | 50 | 6 | 50 | 100 | *Weavers.*—One family fine silk cloths, the rest common white or coloured cotton cloths or mixed silk and cotton cloths. One family of cotton carpet weavers. |
| Harpanahalli | 23 | 12 | 12 | 4 | 6 | 3 | *Weavers.*—Mixed silk and cotton coloured cloths and coarse white cloths. |
| Hirahall | 100 | 5 | 2 | 6 | 2 | 4 | *Weavers.*—Common coloured cotton cloths with silk borders. Brass-smiths—Common beaten work. |
| Hospet | 144 | 29 | 16 | 8 | 11 | 2 | *Weavers.*—Mixed silk and cotton and common cotton coloured cloths. |
| Humpassgra | 400 | 7 | 5 | ... | 1 | ... | *Weavers.*—One or two families making fine silk cholis and cloths. Three hundred and fifty families mixed silk and cotton cloths or cotton cloths with silk borders. Fifty families coarse white cloths. |
| Kampli | 200 | 10 | 4 | ... | 1 | 1 | *Weavers.*—One or two families fine silk cloths. Two hundred families mixed silk and cotton or cotton coloured cloths with silk borders. Two of the carpenters good carvers. One family of muchies painting, lacquering images, toys, etc. |

No. 5(*f*).
Industries
MADRAS,
1887.

| Place. | Number of families. | | | | | | Other particulars. |
|---|---|---|---|---|---|---|---|
| | Weavers. | Gold-smiths. | Carpenters. | Brass-smiths. | Black-smiths. | Potters. | |
| *Bellary district*—contd. | | | | | | | |
| Ráyadrug | 300 | 10 | 10 | ... | 5 | 11 | *Weavers.*—Fifty families ordinary silk cloths and common coloured cotton cloths, with silk borders of mixed silk and cotton cloths. Two hundred families common white cloths. |
| Tambrahally | 182 | 11 | 14 | ... | 8 | 10 | *Weavers.*—One hundred and eighty-two families as at Bachegandanahalli. |
| Nimbalagerry | ... | ... | ... | .. | ... | ... | Ten families of weavers of woollen cumblies. Fine cumblies costing up to R40 made to order. |
| *Anantapur district.* | | | | | | | |
| Kalyándrug | 100 | ... | ... | ... | ... | ... | *Weavers.*—Mixed cotton and silk cloths or common coloured cotton cloths with silk borders. |
| Chilamattur | .. | .. | ... | ... | ... | ... | A few families making gunny bags. |
| Dharmavaram | 150 | 5 | 7 | 1 | 2 | 3 | *Weavers.*—Four or five families fine silk cloths; good colours and patterns, the remainder mixed silk and cotton cloths or common coloured cotton cloths with silk borders. |
| Gooty | 74 | 16 | 2 | 1 | 5 | 10 | *Weavers.*—Common white cloths; one family making a kind of white cloth called duppattlu worn by Brahmins. |
| Gutur } | ... | ... | ... | ... | ... | ... | A few families making glass bangles. |
| Somadapally } | | | | | | | Eight famlies making common country paper. |
| Namadalla | ... | ... | ... | ... | .. | ... | |
| Pamidi | 5 | 9 | 2 | .. | 3 | 6 | Thirty houses of cotton printers employing two hundred workmen; black printed screen cloths, hankerchiefs, etc.; one man painting mythological subjects by hand. |
| Kistapaud | 238 | 3 | 3 | ... | 3 | 6 | *Weavers.*—Mixed silk and cotton cloths or common coloured cotton cloths with silk borders. |
| Ráyalcheru | ... | ... | ... | ... | ... | ... | One stone mason making paper-weight, pestle and mortars, etc., out of a peculiar stone found in the neighbourhood. |
| Tadpatri | 311 | 11 | 5 | ... | 2 | 5 | *Weavers.*—Mixed silk and cotton cloths or common coloured cotton cloths with silk borders. |
| Yadiki | 380 | 2 | 2 | .. | 2 | 6 | *Weavers*—Two hundred and sixty families common coloured cotton cloths with silk borders. One hundred and twenty families common white cloths. Four families mixed silk and cotton cloths. |

## (*g*).—*Order of the Madras Government on Mr. Havell's third report.*

Order—dated 29th June 1887, No. 619, Revenue.

Recorded.

2. The Government observe that Mr. Havell says nothing in the body of his report regarding the damascening on steel carried on at Kurnool or the excellent blankets or cumblies made at Nimbalagherry in the Bellary district.

3. The districts which Mr. Havell has not visited are Nellore, Chingleput, South Arcot, Coimbatore, Nilgiris, Tinnevelly, Malabar and Canara. The Commissioner will in due course submit proposals for a tour in some of these districts next cold season.

## (*h*).—*Fourth report by Mr. Havell on the industries of Madras.*

[From E. B. HAVELL, Esq., Superintendent, School of Arts, to the Commissioner of Revenue Settlement and Director of the Department of Land Record and Agriculture, dated Madras, 5th May 1888, No. 227 :—]

With reference to G.O., dated 24th October 1887, Mis. No. 6411, Revenue, I have the honour to submit my report on the arts and manufactures of the Malabar and Coimbatore districts.

2. *Cotton weaving.*—There is very little in this industry to call for special remark. The following may be noticed :—

*Coloured cloths.*—At Bhaváni in the Coimbatore district about 60 families weave inferior coloured cloth worn by females. In Coimbatore, 100 families weave a dark-red cloth worn generally by Mahomedans as a head handkerchief or upper cloth; it is woven with white stripes.

*White cloths.*—Coarse white cloths worn by ryots are woven in villages all over the districts; about 500 families in Coimbatore town weave superior white cloths with brocaded ends, but they are not to be compared with the finest manufactures of Madura and other places. Common white and coloured cloths are also made at Kollegál, The weavers number about 382 families.

3. *Cotton carpets*—Fifteen families at Bhaváni weave cotton carpets. Their productions are very glaring in colour on account of the cheap bazaar dyes which are commonly used. The best native designs, too, are generally spoilt by the introduction of some common European pattern badly arranged. Bhaváni is said to have been once famous for its dyes; but the art seems to have been lost for indigo is the only dye which is prepared locally. Country thread is nearly always used for the warp, while English thread is preferred for the weft. The explanation given is that English thread is not strong enough to be used as warp. This practice is just the reverse of which is usually adopted for cotton cloth weaving. Another point to be noticed is the custom of arranging the warp for cotton carpets perpendicularly; this entails a rather awkward arrangement for working the "healds" of the loom, but probably when the pattern is intricate it is, on the whole, the most convenient method. There can be no doubt, however, that for the commoner patterns of simple stripes, the horizontal position saves much time; it is seldom adopted, probably because the weavers' houses are, as a rule, too small to admit of it.

4. *Silk weaving.*—In Coimbatore town a few families weave silk turbans and cloths of ordinary quality. Fifteen families at Kollegál are engaged in the same industry. Their cloths are generally of plain crimson colour (either Cochineal or lac dye) with the ends simply brocaded; all the specimens which were shown to me were badly woven and not remarkable in any other respect. Common bazaar dyes seem to be now the most popular; formerly it is said the town was noted for the fineness of its lac dye. I append a memorandum on the silk culture carried on in the taluk prepared from the notes kindly supplied to me by M. R. Ry. K. Subroyer, Sheristadar of Kollegál.

5. *Printed cottons.*—At Tirupúr and Dharápuram in the Coimbatore district, a few families make rough palampores and other chintzes of a common description.

6. *Grass-mat weaving.*—The Pálghat mats are well known. The best are made in several villages near the town of Pálghat; but common ones are made in many places in both districts. The mats are woven with the split stalks of *Cyperus pangorei*, a sedge which grows in the locality. The female members of the family generally prepare the sedge for weaving by dexterously splitting it into about four strips and at the same time removing the pith from the inside. These strips are laid in the sun and when dry are ready for weaving unless it is desired to colour them—a deep red is produced by boiling the strips in water with Sappan wood and Kasa leaves ( *Memecylon edule* Roxb.). Black is obtained by steeping strips which have been already dyed red in a mixture of wood ashes and black mud taken from the beds of tanks. Yellow from turmeric is sometimes used; but it is not permanent. The mats are woven with much care; it is said that a good mat will hold water for 24 hours; even the strings forming the warp are prepared by the weavers themselves from country hemp in preference to the cheap twine which they can obtain in the bazaars.

7. *Gold and silver work.*—The gold ornaments in the Malabar district, especially those worn by Nayar and Tier females, are very fine; in fact I have seen none finer in any part of India. The drawings, which I forward herewith, will give a better idea of them than a written description. Figures 1, 2, 3 and 4 show one type, necklets made up of a repeat of some highly conventionalized form such as a tiger's tooth (figure 1) or cobra's hood (figure 2) stamped from a die and finished by chasing. The central link in figure 3 is the tali or marriage token. The other type is made up of minute plates and wires and pellets of gold soldered on to a wedge-shaped foundation as shown in figures 5, 6, 7 and 8. The fringe of gold pendants, which most of the patterns have, has a peculiarly light and graceful effect which the drawings do not express. Figure 7 shows an elaborate piece of work which, it is said, occupied a workman for three months; figures 5, 6 and 8 are, however, better designs. The necklets are tied on by a silk thread connecting all the links and are generally finished at either end by a tassel as shown in figure 9. Figure 10 is an ornament worn by Moplah women. It consists of a number of chains, the links being thin plates of gold pierced or otherwise ornamented, which are arranged in rows and attached at either end to an ornamental plate of gold. It is not strictly speaking a neck ornament, as it is unusually long, falling right over the bosom like a native flower garland. Figure 9 is another Moplah pattern, a simple but effective arrangement, set with rubies and emeralds. In the Coimbatore district, the silver ornaments worn by the Vellala caste are also noteworthy. Figure 11 is the type of wristlet worn, but such a fine specimen is not often met with. It is worked in the same way as the gold ornaments (figures 5, 6, 7 and 8). Figures 12 and 13 show two kinds of armlets. The pattern of the first is probably suggested by the shape of the garlic bulb, but it is called by the fanciful name of "parrot's beak;" the other consisting of small hollow cylinders generally strung together in a double row, sometimes plain and sometimes with ornamental ends (as in the example), may have been derived from the practice of wearing receptacles for charms to protect the person, though the intention in this case is now lost sight of.

8. *Brass-smiths.*—Kunhimangalam and Cherupalcheri are the chief places in the Malabar district for brass-smith's work. The workmen are exceptionally skilful in casting vessels of all kinds, lamps, etc., especially large cooking vessels, often 5 or 6 feet in diameter, called "Urutes" (figure 14), which are used at great festivals. The shapes of the various vessels are interesting and characteristic. Figures 15 and 16 are two forms of water vessels in common use. Figure 17, a hand lamp, is suggestive of classic design, while the temple lamp, figure 18, might call to mind the seven-branched candlestick sculptured on the arch of Titus. Figure 19 is an ornamental stand between three and four feet high, used at the marriage ceremonies of Moplahs to hold *pan supari.* In the

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Coimbatore district, there are about 50 families of brass-smiths at work at Anapalayam near Tirupur. They make bell metal gongs and trays besides the ordinary domestic utensils. The gongs seem to be made of the ordinary native composition of four parts copper to one of tin; they are very roughly hammered and badly finished. All the work turned out is of an inferior description. In Coimbatore town, there are about 45 families of ordinary workmen.

9. *Black-smiths, Carpenters and Wood-carvers.*—They are the ordinary workmen found in every district. Iron is smelted in a few jungle villages in the Waláwanad taluk of Malabar, and Bhaváni and Satyamangalam taluks of Coimbatore; but the industry seems to be fast dying out. In wood carving, there is nothing worth noticing in either district.

10. *Lapidaries.*—About ten families at Chettipalayam, a village near Tirupúr in the Coimbatore district, work crystals for spectacles and make crystal and glass beads and various kinds of ornaments, lingams and other sacred symbols and images. The process is exceedingly simple like all native processes, but the work turned out is neat and well finished. The crystals, etc., are ground on emery discs which are prepared as follows:—Corundum, which is said to be found in the neighbourhood, is first pounded up to any desired degree of fineness, a sufficient quantity of lack to form the disc is melted up and mixed with the powdered corundum; as the lac cools, it is flattened out to a circular shape on a stone which has been first sprinkled with a little more of the powder to give the surface of the disc the proper texture. A number of discs are prepared in this way with corundum powdered more or less finely to suit the quality of the work. They are attached by a little melted lac to the ordinary native lathe which is worked with a bow in the ordinary way except that the crystal worker turns the lathe with the right hand and works with the left and does not, like the carpenter or metal worker, employ an assistant. The discs are of course kept wet while the crystals are being ground. Smooth wooden discs are used for the final polishing processes, the crystals being worked with water and a paste made of corundum very finely ground. Crystals are procured locally and from the surrounding districts. The amethysts found at Vallam near Tanjore are sent to Chettipalayam to be polished. The workmen, however, are not particular in choice of materials; when they have no special order on hand, they will use any coloured pebble or pieces of broken glass to make up into ornaments.

11. The Coimbatore District Manual states that good gunny of sunn hemp is manufactured in some of the villages situated in the north of Erode and south of Bhaváni taluks; but I could obtain no information in those localities regarding the industry. It has probably died out.

12. I append a detailed statement giving particulars of the number of workmen and the industries in which they are engaged, and also the memorandum on silk culture referred to above:—

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## ENCLOSURE No. 1.

| Place. | Number of families. | | | | | Other particulars. |
|---|---|---|---|---|---|---|
| | Cotton weavers. | Gold-smiths. | Carpenters. | Black-smiths. | Potters | |
| *Malabar district.* | | | | | | |
| Calicut | ... | 28 | 14 | 16 | ... | Four carpenters can do ordinary carving. Sixteen families of ordinary brass-smiths and four families of skilled workmen who can cast images, lamps, etc. (Basel Mission Weaving Establishment and Tile Works). |
| Cannanore | 116 | 37 | 13 | 17 | ... | *Weavers.*—Twenty-four families make inferior white cloths; ninety-two families inferior coloured cloths; forty-three families of leather workers four families of brass-smiths. (Basel Mission Weaving Establishment.) |
| Cheruplacheri | ... | 3 | 12 | 7 | ... | Three families of brass-smiths who can cast lamps, images, etc., and do ornamental work. |
| Kunhimangalam | 30 | 2 | ... | 4 | 12 | Twenty families of skilled brass-smiths who can do all kinds of cast and beaten work. |
| Pálghat | 47 | 232 | 207 | 54 | 140 | *Cotton weavers.*—Inferior white cloths. Seventeen families of grass-mat weavers. Nineteen families of ordinary brass-smiths. |
| Odavanur, Manjalur, Yedatarai | ... | ... | ... | ... | ... | Villages near Pálghat where grass mats are made. Odavanur and Manjalur, ten familes each. Yedatarai, about six families. |
| Tellicherry | 65 | 30 | 38 | 20 | ... | *Cotton weavers.*—Inferior white cloths. Four families of ordinary brass-smiths. (Basel Mission Weaving Establishment.) |
| *Coimbatore district.* | | | | | | |
| Bhaváni | 85 | 9 | 6 | 4 | 6 | *Cotton weavers.*—Inferior white and coloured cloths; fifteen families of cotton carpet weavers; four families of ordinary brass-smiths. |

ENCLOSURE No. 1—*contd.*



| Place. | Number of families. | | | | | Other particulars. |
|---|---|---|---|---|---|---|
| | Cotton-weavers. | Gold-smiths. | Carpenters. | Blacksmiths. | Potters. | |
| *Coimbatore district*—contd. | | | | | | |
| Coimbatore | 600 | 60 | 95 | 50 | 60 | *Cotton weavers.*—About 500 families make white laced cloths of fairly good quality, the remaining 100 weave a closed striped cloth worn chiefly by Mahomedans. Five families of silk weavers ordinary work. Common grass mats, fifty-five families; twenty-five carpenters can do ordinary carving; forty-five families of brass-smiths including fifteen skilled workmen; fifty families of leather workers. |
| Dhárápuram | 24 | 25 | 15 | 13 | 24 | *Cotton weavers.*—Inferior white cloths. Thirty families of leather workers; seventeen families weaving common grass mats; ten families of the dyer's caste making inferior palampores. |
| Kollegál | 382 | 22 | 20 | 4 | 7 | *Cotton weavers.*—Common white and coloured cloths. Ten families of silk weavers making cloths of ordinary quality; four families of ordinary brass-smiths. |
| Tirupúr | 60 | 5 | 5 | 4 | 4 | *Cotton weavers.*—Chiefly inferior coloured cloths. Five families of the dyer's caste making inferior palampores. |
| Villages near Tirupúr— | | | | | | |
| Anapalayam | ... | ... | ... | ... | ... | About fifty-four families of brass-smiths, of which thirty-six families do plain beaten work; eleven families make gongs, trays, etc., of beaten bronze, seven families cast chembus, lamps, images, etc. |
| Chettipalayam | ... | ... | ... | ... | ... | Ten families of lapidaries making crystal spectacles, ornaments, lingams and vigrahams. |

## ENCLOSURE No. 2.

### Silk culture in the Kollegal Taluk of Coimbatore.

*Mode of cultivating the mulberry plants.*—In the rainy season, immediately after the fall of rain, fields containing black soil or clay are ploughed 4 or 5 times into furrows and the soil loosened. On another fall of rain, mulberry cuttings each one foot in length are planted in small pits a yard apart in the same manner as sugarcanes are planted. Within two days these cuttings begin to take root and to sprout. At this time the plantation is weeded and the soil around the plants broken up and fresh earth mixed therewith. At the end of four months the plants grow to perfection.

*About the rearing of silk-worms.*—One seer of cocoons is usually bought for one rupee. They are laid in large bamboo trays (resembling sieves) which are suspended by ropes for eight days out of the reach of rats and ants. On the ninth day the moths begin to come out of the cocoons. They are at once removed to another bamboo tray in which they are kept for one day. Next day the male moths are taken out and thrown away. Before the evening of that day female moths lay their eggs and the next day they are also removed from the trays and thrown away. The trays are then hung about the roof and covered with thin cloth to protect the eggs from flies, ants and lizards. On the seventh day after the eggs are laid, the silk-worms begin to come. out. At this stage the worms are fed with small cuttings of tender leaves of mulberry plants five times in the day and five times in the night. Thus they are fed for seven days. On the eighth day they discontinue feeding and lie down without moving. In this state they are said to be attacked with fever. On the morning of the next day they recover and are fed as before with small cuttings of mulberry leaves. In this way they are fed for four days. Then they are attacked with "fever" a second time and discontinue feeding. Next day they are again fed as usual. After the lapse of four more days they are attacked with "fever" a third time. Next day they recover as usual and are fed with full-grown mulberry leaves for four days longer, when they are attacked a fourth time. At the time of the first "fever" the worms in one tray are transferred to two trays. On the second attack the worms in two trays are removed to eight trays, for the third "fever" they are removed to sixteen trays and for the fourth to thirty-two trays. In four days after the fourth attack the worms grow large and change colour from white to purple. At this stage they discontinue feeding altogether and are removed to bamboo tatties called "*chendrigai.*" Three days afterwards they begin to spin cocoons. During the process the tatties are exposed to the morning sun at sunrise for about half an hour and then hung up to the roof inside the house. In two days more the cocoons are collected in bamboo baskets; a sufficient number are laid aside for a fresh propagation and the rest are subjected to a

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steaming process to kill the chrysalides. The silk is unwound from the cocoons by putting them in a chatty with boiling water and a few cleaning nuts (Ponnalangai) and attaching the ends of two or more cocoons to a light wheel turned by hand. The cleaning nuts probably serve as a solvent for the natural gum secreted by the silk-worm for building the walls of his cocoon together. There does not appear to be any specific disease prevalent in the taluk among the silk-worms. They are said to be affected in abnormal seasons of heat or rain, but not to such an extent as to produce a marked loss in the quantity of silk. The following table shows the average price of raw silk per maund during the last ten years:—

| | Year. | Average price. Rs. A. P. |
|---|---|---|
| The price of one maund of raw silk in the year | July 1879 to June 1880 | 130 0 0 |
| " " " " " " | 1880 " " 1881 | 140 0 0 |
| " " " " " " | 1881 " " 1882 | 125 0 0 |
| " " " " " " | 1882 " " 1883 | 120 0 0 |
| " " " " " " | 1883 " " 1884 | 100 0 0 |
| " " " " " " | 1884 " " 1885 | 90 0 0 |
| " " " " " " | 1885 " " 1886 | 110 0 0 |
| " " " " " " | 1886 " " 1887 | 140 0 0 |
| " " " " " " | 1887 " February 1888 | 130 0 0 |

The price is said to fluctuate according to the increase or decrease in the importations of China or other silk.

*List of the villages in which silk-worms are reared.*

| | Number of ryots rearing silk-worms. |
|---|---|
| 1. Allalby | 100 |
| 2. Kunthore | 40 |
| 3. Chilukanadi | 10 |
| 4. Thagarapuram | 30 |
| 5. Hosamalinghi | 30 |
| 6. Ther rampalli | 15 |
| 7. Uttampalli | 10 |
| 8. Kunakalli | 30 |
| 9. Meelur | 10 |
| 10. Mudigundam | 20 |
| 11. Kongaralli | 100 |
| 12. Kannur | 40 |
| 13. Mangalam | 50 |
| 14. Thondinthuvadi | 20 |
| 15. Chikkindunadi | 5 |
| 16. Polliem | 30 |
| 17. Kariyanapuram | 5 |
| 18. Kemmellipuram | 5 |
| 19. Kodipuram | 5 |
| 20. Chennelinganhalli | 5 |
| 21. Ikkadalli | 10 |
| 22. Mathipuram | 5 |
| 23. Hanur | 20 |
| 24. Basthipuram | 5 |
| 25. Honderbalu | 10 |
| 26. Jakkalli | 5 |
| 27. Thimmarajapuram | 10 |
| 28. Manduvanalli | 20 |
| 29. Aruvanapuram | 10 |
| Total | 655 |

## (i).—Order of the Madras Government on Mr. Havell's fourth report.

ORDER—dated 20th June 1888, No. 441, Revenue.

His Excellency the Governor in Council has read Mr. Havell's report with interest.

2. The Government are of opinion that the drawings of native jewellery, etc., might with advantage be forwarded, with an explanatory article which Mr. Havell will no doubt be able to draw up, for publication in the *Indian Art Journal*. The album referred to by the Board would then be unnecessary.

3. Proposals for Mr. Havell's next tour should be submitted at an early date. The Government hope that with another tour he will be able to complete the survey of the Presidency, and that he will then be in a position to compile an account of the industries and arts of Madras.

## *No. 6.—Letter from the Government of India re Mr. Havell's reports.*

No. 95, dated the 12th February 1889.

From—The Secretary to the Government of India, Home Department,

To—The Chief Secretary to the Government of Madras.

No. 199, dated 18th June 1888.

I am directed to acknowledge the receipt of your letter No. 711 (Education), dated the 3rd December last, stating, with reference to the enquiry made in Home Department letter No. $\frac{14}{457}$, dated the 2nd November 1888, that no industrial survey of the nature of that contemplated in paragraph 25 of the Home Department Resolution marginally noted has been undertaken in the Madras Presidency, and at the same time forwarding certain Proceedings of the Government of Madras containing reports on the condition of industrial art in fifteen districts of the Presidency submitted by Mr. Havell, Superintendent of the School of Arts, Madras, as the result of tours undertaken by him under the orders of the Local Government.

It is stated that the general result of Mr. Havell's reports is to show that the survey suggested by the Government of India would be infructuous, but that should the Government of India consider further action desirable, His Excellency the Governor in Council would be glad to be furnished with information as to the precise nature of the survey contemplated and the agency by which it is proposed to be made.

2. In reply I am to say that the enquiry which is being made by Mr. Havell into the arts and industries of the Madras Presidency is such an enquiry as was contemplated by the Government of India, with the exception that Mr. Havell looks on industries from a more strictly artistic point of view than the Government of India had contemplated, and omits to notice the large manufacturing operations which in the Madras Presidency as in other Provinces are doubtless carried on in connexion with Railways, Mills or factories. It might be possible to enlarge the scope of Mr. Havell's interesting enquiries in this direction.

3. The Government of India understands that Mr. Havell will compile an account of the industries and arts of Madras after the completion of his inquiry, and that His Excellency the Governor in Council having supplemented Mr. Havell's enquiry in the direction now indicated, so far as may be necessary, will then be in a position to decide whether any good would result from the establishment of technical schools at the seat of any industry, or from the maintenance of any students to learn the theory and practice of the particular industry at any suitable place in the Presidency. The Government of India will be glad to be informed in due course of any orders which His Excellency the Governor in Council may find it desirable to pass in this connexion.

## *No. 7.—Note on Technical Education in Madras.*

**No. 7. Technical education in MADRAS, 1889.**

No. 128 (Educational), dated the 2nd March 1889.

From—The Chief Secretary to the Government of Fort St. George,

To—The Secretary to the Government of India, Home Department.

G. O., dated 18th September 1886, No. 604.
" " 6th May 1887, " 238.
" " 9th September " " 497, Mis.
" " 2nd March 1889, " 127.

With reference to paragraph 2 of your letter, No. 219, dated 23rd July 1886, I am directed to forward, for the information of the Government of India, copies of the marginally-noted orders, recording the replies of the several officers consulted on the subject of technical education, and

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to make the following remarks on the suggestions contained in the memorandum drawn up in the Home Department and forwarded with your letter above alluded to. I am to express the regret of His Excellency the Governor in Council that this reply has been so long delayed—a result which has been principally due to the length of time found necessary to obtain the opinions of the several Faculties of the University.

2. During the interval which has elapsed since the receipt of your letter, the subject of technical education has received the attentive consideration of the Director of Public Instruction and of this Government, and the several directions the recommendations set forth in the memorandum and summarized at paragraph 92 thereof, have been carried out or considered and rejected as inadvisable. The exhaustive report of the Director of Public Instruction on the educational progress of the Presidency during 1887-88—a copy of which has already been forwarded to the Government of India—shows the general progress that has been made, and I am now to offer the following observations on the specific recommendations made in the memorandum of the Home Department of the Government of India, and to state how far they meet with the approval of this Government, and how far they have been, or can be, carried out.

G. O., dated 18th September 1886, No. 604, Edl.
" " 7th November 1888, " 634 "

3. The first recommendation affecting this Presidency is that greater facilities should be provided in mofussil colleges for the study of law and medicine. From the marginally-noted Proceedings it will be seen that in the year 1885 the Director of Public Instruction forwarded, for the opinion of the Honourable the Judges of the High Court, certain suggestions for improving the study of law. Of these, the second was that law classes should be opened in four of the mofussil Government colleges. But the High Court, with the exception of the late Chief Justice, was not in favour of this idea, believing that the instruction thus afforded would only be of a second-rate quality, and that it would be better to develop and improve the legal instruction provided in Madras town. This view, which has been accepted by the Director of Public Instruction, has also the concurrence of His Excellency the Governor in Council, who has recently expressed general approval of the Director's proposals for the creation of a separate Law College at the Presidency town, to be presided over by a competent English barrister. The details of this scheme will be submitted to the Government of India when matured, but meantime this Government is not in favour of instituting mofussil law lectures. As regards mofussil medical schools, the Surgeon-General with Government, in his letter recorded in G. O., dated 6th May 1887, No. 238, expresses the opinion that the existing schools can turn out as many hospital assistants as can be provided for at the present rate of demand, and the Government agree with this opinion.

4. The next recommendation which affects this Presidency is that the instruction in all medical schools be made more practical than at present, and that facilities for practical training should also be provided at the College of Engineering. It will be observed from the letter of the Surgeon General with the Government above quoted that, while Dr. Bidie considers that practical medical knowledge must be mainly acquired by clinical practice in the hospitals rather than by class-room instruction, he is in favour of larger illustration by practical demonstrations of the lectures on Physiology, Pathology and Hygiene, and advises the provision of a properly equipped laboratory for teaching the last-named subject. He has now been called on to report what steps he has taken, or proposes to take, to carry out this programme. In regard to the College of Engineering, the rules of the institution had been thoroughly revised, after prolonged discussion, before the Home Department memorandum on technical education was received. The revised rules are recorded in G. O., dated 7th January 1886, No. 7 (Educational), and it will be seen that they require a practical course lasting two years to be undergone by all students of the Engineer and Engineer-Subordinate classes. This practical course is now in operation, the students being attached to the Public Works Workshops. The suggestion (paragraph 70) that the Railway workshops should be similarly utilized has the approval of this Government and will be acted on if opportunity arises. It will also be observed that the Engineering Faculty of the University has expressed the opinion that it would be well to require all candidates for the B.C.E. degree to produce a certificate of having passed through a practical course.

5. The seventh recommendation, which is the next affecting Madras, is that agricultural and veterinary schools, or classes in high schools, should be established where possible. This Government in G. O., dated 17th September 1883, No. 610, directed the introduction of a scheme of agricultural instruction into the Government high and middle schools, but the withdrawal of Government from upper secondary education has put it out of the power of His Excellency in Council to give effect to this resolution.

6. The ninth, tenth, eleventh and twelfth recommendations refer to the introduction of drawing as a compulsory subject, in all schools, the teachers of which are competent to teach it; its adoption as a necessary qualification for all teachers in middle and high schools; the inclusion of drawing and elementary science as compulsory subjects in the Middle School examination; and the introduction of the latter as a compulsory subject of instruction in all middle and high schools. His Excellency the Governor in Council is fully alive to the great importance of drawing as an instrument of technical education, and recognises the desirability of encouraging, as far as possible, the study of elementary science. Both subjects are already included alike in the recently-sanctioned scheme of a Primary School examination, in the Middle School examination, and in the Higher Examinations in Science, Arts and Industries. Elementary Physics and Chemistry are, moreover, at present a compulsory subject in all high schools because they form a compulsory part of the Matriculation Examination of the University. They will also be included in the contemplated High School examination referred to below. But His Excellency in Council is compelled to agree with the Director of Public Instruction in considering that the recommendations made in the memorandum are too sweeping to be for the present practicable. There is no sufficient supply of teachers in these subjects for it to be possible to make them compulsory, and some time must elapse before this can be remedied. In the meantime, the importance of drawing and elementary science will not be in any danger of being lost sight of.

G. O., dated 9th February 1888, No. 100, Edl.
" " 15th January 1889, " 17, "

G. O., dated 18th September 1886, No. 604.

7. The most important of the remaining recommendations advocate that a "modern" side should be created in the High School course; that the University should establish a "modern" side entrance examination; and that a technical branch should be added to middle and high schools, leading up to the University test. With reference to these suggestions, I am directed to state that the whole question of encouraging technical education in middle schools, high schools and colleges is at present under the consideration of this Government. Proposals for the institution of a new examination with a technical side, to be called the High School examination, were submitted by the Director of Public Instruction in 1887. They were referred by G. O., dated 24th August 1887, No. 458, to a committee for report, and the committee's report was dealt with in G. O., dated 11th July 1888, No. 401. The opinion of the University on this scheme and representations from several leading bodies of educationists are now before Government, a further report from the Director of Public Instruction being alone awaited. In these circumstances, it will be convenient to postpone any reference to these questions until a decision is come to on the High School examination scheme. and until a reply can be made to Home Department letter, No. 9—347, dated 18th September 1888. No. 7. Technical education in MADRAS, 1889.

8. Among other steps for the encouragement of technical education which have recently been taken in this Presidency may be mentioned the establishment of the Victoria Technical Institute, the creation of commercial classes in connection with Pacheayappah's Aided College, and the range addition of commercial and industrial subjects to the list of optional subjects of the Middle School examination. From the letter, dated 4th August 1887, of the Secretary to the Victoria Technical Institute, recorded in G. O., dated 9th September 1887, Mis. No. 497, it will be seen that that institution has promised to aid the managers of high and middle schools in such ways as may be found practicable, and so far as means permit, towards imparting instruction in technical subjects. From the marginally-noted orders, of which copy is enclosed, it will also be apparent that the Institute is likely to take an important part in fostering technical instruction in this Presidency, and in view of this, it has received a substantial grant-in-aid from this Government.

G. O., dated 15th September 1888, No. 546, Edl., with copy of memo. by Mr. John Adam.

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# *No. 7(a).—Note by the Director of Public Instruction on Technical education in Madras.*

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No. 5883, dated the 25th August 1886.

From—D. DUNCAN, Esq., M.A., D.Sc., Acting Director of Public Instruction, Madras,

To—The Chief Secretary to the Government of Madras.

In returning endorsement, No. 1280 C., dated 4th August 1886, referring for early remarks the note on technical education in India drawn up by command of the Viceroy, I have the honour to state my views on some of the points raised. I shall follow the order adopted in paragraph 92 of the note.

5. 92 (5).—I do not think that the course of instruction now given at the College of Engineering can be described as wholly theoretical. Captain Love has, at my request, given a brief outline of the practical instruction actually given and contemplated under the present rules. I beg to enclose his letter, dated 10th August 1886, No. 7017, with its two enclosures.

6. 92 (7).—The history of agricultural education down to 1883 is recorded in G.O., dated 17th September 1883, No. 610 (Educational), in which sanction was given to the introduction of a scheme of agricultural instruction to be compulsory in the middle school, but optional in the high school, departments of the Government schools at Bellary, Salem and Madura. No action has been taken, however, on this order, pending the settlement of the constitution of the Saidapet College and Farm.

The schools at Bellary and Salem have since then ceased to exist as Government institutions. Agriculture is one of the optional subjects for the middle school examination. At the examination of December last, twelve candidates selected this subject.

Veterinary instruction forms part of the course of study at Saidapet, where there is a Veterinary Hospital at which the students receive practical training.

Government having for the most part already retired from the direct management of secondary education, it has not up till now been deemed advisable to attach agricultural or veterinary classes to the few remaining Government high schools. But under paragraph 9 of the Technical Education Notification published in G.O., 31st March 1886, No. 198 (Educational), classes for teaching those subjects may be opened in Government high schools, and aid may also be given under Chapter V of the Grant-in-aid Code for opening similar classes in aided institutions. One great difficulty at present is the lack of competent teachers, few of the students educated at the Agricultural College having adopted the profession of teaching. Another difficulty lies in the fact that the curriculum in high schools is controlled entirely by the Matriculation examination of the University. The introduction of agriculture and veterinary science into such schools is really a part of the larger question of the bifurcation of studies by the institution of a "modern" side, to which reference will be made further on.

7. 92 (8).—As to the teaching of land surveying, Captain Love, in his letter referred to above (paragraph 5), states what is done in the College of Engineering. Under the recently reorganised

No. 7(a). Technical education in MADRAS, 1886.

curriculum of the Agricultural College, surveying, both theoretical and practical, will form a special subject of instruction up to the standard of the syllabus in the new technical education scheme.

8. 92 (9.10 and 12).—In this presidency, drawing is not compulsory in schools for general education. Though instruction in drawing is given in the Teachers' College and the Government Female Normal School, Madras, yet I doubt whether many of the teachers turned out by these two institutions could be regarded as competent to teach it. It forms an optional subject in the third and all the higher results standards of native schools, and in the fifth and higher standards in European schools. In the middle school examination, it may be brought up in certain circumstances by pupils in ordinary schools, and special stress is laid on it in connexion with science, art, and industrial schools.

To pass an order making drawing compulsory in all schools, the teachers of which are competent to give instruction in it, would not have much immediate effect, the number of schools having teachers possessing this qualification being very small. I attach the greatest importance to drawing, but I am not prepared to recommend that it should be ruled to be an essential qualification in a secondary school teacher, or that it should be made compulsory even in schools having teachers competent to instruct in it. Were it to be made compulsory in some schools and optional in others, the former would require to be relieved of some of the already existing compulsory subjects; and this could not be done. Moreover, I must repeat the remark already made that the course of study in high schools is determined by the University Matriculation examination. Were a " modern" side instituted, drawing would, as a matter of course, be compulsory in the " modern " school. But as long as high schools have merely the Matriculation examination in view, I consider it hopeless to attempt introducing any real reform in the matter of drawing. In the middle school it is different. The scheme of examination recognizes drawing, and here I think something might be done, though the pressure on pupils is already too great to permit of drawing being added to the list of compulsory subjects; while the lack of competent teachers would render it impossible to demand it of all schools. In the struggle for recognition in our school curricula, which at the present day is so fierce, many subjects to which considerable importance is attached must give place to subjects of yet greater importance. The recommendations (9) and (10) in paragraph 92 are to my mind too sweeping. In classes below the high school, an improvement in drawing would soon be effected if in results grant schools a higher rate of grant were given for proficiency in drawing, and in salary grant schools a higher grant were given to teachers possessing a certificate of fitness to teach drawing.

9. 92 (11 and 12).—Elementary Physical Science (Physics and Chemistry) being included in the Matriculation examination, is a compulsory subject in all high schools. In classes below the high school, it is not compulsory. In Native schools, agriculture is an optional subject for the 4eh, 5th and 6th standards, and hygiene for the 3rd and 4th standards. In European schools elementary science is optional for the 4th, 5th and 6th standards. In the middle school examination which is the 7th standard for results schools, the physical sciences receive a prominent place, though they are not reckoned compulsory, except in recognized science schools.

In procuring competent science teachers, the utmost difficulty was experienced until recent years. Of late, however, in consequence of the large number of young men who graduate taking physical science as their optional subject, hardly any difficulty is experienced in getting an adequate supply of competent instructors. Chapter V of the Grant-in-aid Code holds out special inducements to persons who wish to become teachers of science. It was with a view to enable this class to qualify as teachers of science, more especially of the sciences connected with agriculture, that Mr. Grigg recommended, and Government sanctioned, the transfer of the Teachers' College to Saidapet. This transfer is kept in abeyance solely for want of funds.

10. 92 (13).—The steps that have been taken in this presidency with a view to carry out the recommendation of the Education Commission that there should be two courses of study in secondary schools, the one mainly literary and the other mainly practical and " modern," are stated in the following extract from my memorandum recorded in G.O., 8th April 1886, No. 211 (Educational):—

> " *Secondary Education.*—In this presidency, the middle school examination is accepted as a sufficient general test of fitness for the public service, and it has been deemed expedient that the bifurcation of studies, so strongly recommended by the Government of India, should begin at this stage. The midddle school examination notification, a copy of which as recently amended, is submitted, contains a variety of optional subjects, including commercial, technical, scientific, and industrial subjects; and pupils desirous of qualifying for commercial and non-literary pursuits in after-life may, even at this stage, acquire a knowledge of the rudiments of the special branches of study they choose to enter on. The elaborate scheme for the development of scientific and technical education in this presidency, which has been in the main approved by Government and which is shortly to come into force, will lead to the early formation of special classes in connection with upper secondary schools to prepare pupils for the examinations provided for in the new scheme."

A commercial middle or lower secondary school is now an accomplished fact in connexion with Pachaiyappa's Educational Endowments. Full details as to the working of this school were submitted to Government along with my letter, No. C.-172, dated 21st July 1886. It is proposed that this commercial middle school shall lead up to a commercial high school in connexion with examinations to be held under the auspices of the Madras Chamber of Commerce. *

* Since this was drafted, I have learnt that commercial classes have been started in connexion with one of the Basel Mission Schools in Malabar.

The question of the bifurcation of studies in high schools will, I assume, be referred to the University.

11. 92 (14).—The fourteenth recommendation is one which this department is steadily keeping in view, though little has yet been done towards realizing it. The carpentry class attached to the

Rajahmundry College can hardly be dignified with the name "technical," but, as far as it goes, it is a step in the right direction. Here undergraduates, Brahmins included, work daily in the carpenter's shop under a native instructor. The work is popular among the students, and the articles turned out are said to be, some of them, of very fair workmanship. If only as helping to break down the prejudice among caste Hindus against manual labour, the Rajahmundry experiment deserves special mention.

A movement is on foot among the weavers and metal-workers of **Kumbakonam** to establish a technical or industrial school in that town either independent of, or in connexion with, one of the existing educational institutions.

12. 92 (15).—The writer of the memorandum remarks, on the general character of industrial schools, that they partake more of the nature of charity schools designed to feed, house and clothe a certain number of poor children, than of schools where young people are taught on scientific principles the theory and practice of some of the industrial arts. This has long been my own view of the industrial schools in this presidency. They are most valuable as affording food, shelter and occupation to poor, many of them orphan, children; but their influence in improving the industries of the presidency is practically *nil*. To tell the truth, few of the managers of such schools ever place any such aim before them. Since I entered on the duties of Acting Director of Public Instruction, I have steadily kept in view the desirability of organizing these industrial schools on a plan which will hold out a promise of making them real factors in the industrial progress of the country. In the nature of this case, this is a work of time.

I am thoroughly convinced that all efforts in the direction of industrial and technical instruction should form an integral part of the provincial educational system. The recent notifications on the subject of technical education show this to be the deliberate policy of the Madras Government.

The writer of the memorandum does not approve of the Madras system according to which all these examinations are conducted under the orders of Government by boards of examiners independent of the University. He considers that the University should be the examining body. A word or two will show how the matter stands in Madras. Several years ago, when the middle school examination was instituted, it was proposed to hand over the management of it to the University. The Senate, however, acting on high legal authority, considered themselves precluded by the Act of Incorporation from undertaking the work. According to the opinion of the Senate at that time, the Act empowered the University to hold examinations only with a view to the conferring of degrees. An examination which is not one of the steps towards a degree was decided to lie beyond the province of the University.

Should Government be of opinion that it is desirable to hand over these examinations to the University, the question might be referred to the Senate. In the event of the Senate still being of opinion that the Act did not give them the power to hold such an examination, I suppose it would be possible to amend the Act. In my own view, there is much to be said in favour of the present system.

13. 92 (16).—In order to make the best use of the several educational agencies that may spring up throughout the presidency, I think it is highly expedient that the mofussil technical schools should be organized in subordination to the great central technical schools in the presidency town.

14. 92 (17).—Recommendation No. (17) will, I presume, be referred to the University.

15. 92 (18).—At present I am unable to indicate any source from which the funds might be derived for carrying on a thoroughly-efficient system of technical instruction. At one time Mr. Grigg was of opinion that a considerable sum might be obtained by appropriating the Municipal and Local Fund contributions to the Medical College. Ultimately, no doubt, as Mr. Grigg also points out, the fees may be expected to bring in an appreciable sum. I do not think that much can be got by appropriating any of the allotments now made for the support of higher English education. This is Mr. Grigg's opinion also, as stated in paragraph 6 of his letter recorded in G. O., dated 7th July 1885, No. 1029, Educational.

See paragraph 7 of letter recorded in G. O., 23rd January 1885, No. 54 (Educational).

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## *No. 7(b).—Courses of Instructions at the College of Engineering, Madras.*

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No. 308-C., dated the 10th August 1886.

From—Captain H. D. Love, R.E., Principal, College of Engineering, Madras,

To—The Director of Public Instruction, Madras.

Referring to your demi-official letter, dated 7th August 1886, I have the honour to state that the courses of instruction hitherto undergone at this college are by no means wholly theoretical. The practical portions are here briefly described.

I. *Engineering.*—In the Engineering courses, the students of the "Engineer" and "Engineer Subordinates'" classes make frequent visits of inspection to works for the manufacture of building materials, as well as to works of construction in progress in Madras; and they write full notes of their inspections. They also visit completed works, such as bridges and irrigation works, and make drawings and dimensioned sketches of them.

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II. *Surveying.*—The "Engineer," "Engineer Subordinates," and "Surveyors'" classes undergo a fairly complete practical course in surveying, being out for field work from two to four mornings per week for two years. All the students can handle the chain, compass, level, and theodolite. The main objections to the teaching, as hitherto conducted, are that the instructors are too much with the classes, and that the squads into which the classes are divided are too large to permit of students relying sufficiently on their individual powers.

III. *Drawing.*—Much of the drawing course is thoroughly practical. The students of the "Engineer," "Engineer Subordinates" and "Draftsmen's" classes make drawings of buildings, bridges, and irrigation works from specifications and models, and take out estimates of quantities. The students of the "draftsmen's" class in addition make drawings of buildings, and of masonry and iron bridges from actual measurements made at the works.

2. Under the college reorganization scheme, separate practical courses are to be undergone by the "Engineer" and "Engineer Subordinates'" classes. The proposals made by the committee will be found in paragraphs 1, 6, 8, 9, 16, and 20 of their first report (copy enclosed). The arrangements since sanctioned by Government will be found in Articles V (1) (*b*), V (2) (*b*), IX (1), and IX (2) of the College Rules (copy herewith). On the receipt of sanction to the proposed augmentation of the staff, provision will be made for improvements in the practical portion of the courses in Surveying and Drawing.

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No. 428-C., dated the 16th October 1886.

From—Captain H. D. Love, R.E., Principal, College of Engineering, Madras,

To—The Chief Engineer, Public Works Department.

Referring to your No. 3528-C., dated 12th October 1886, herewith returned, I have the honour to inform you that on 10th August last I addressed a letter to the Director of Public Instruction, in response to a demi-official inquiry from that officer, in which I showed that the education imparted at the College of Engineering, Madras, is not of a wholly theoretical nature.

Embodied in Proceedings of Government, Educational, No. 604, dated 18th September 1886.

2. I had not at that time the advantage of perusing the note on technical education prepared for the information of His Excellency the Viceroy; and I am therefore glad to be now afforded the opportunity of offering you a few remarks on the allusions that are made in that paper to the Madras College.

3. There is no doubt that, beyond the limited practical instruction (described in my letter above referred to), which is imparted during the theoretical courses of study, a regular practical training is, as recommended in the note, much needed for the students of the Engineers' and Engineer Subordinates' classes. Such training is amply provided for by the reorganization scheme recently sanctioned by the local Government—*vide* Articles V (1) (*b*), V (2) (*b*), IX (1), and IX (2) of the College rules, copy of which is forwarded herewith. Under these rules the students of the above classes will undergo a two years' practical course, *viz.*, one year in workshops and one year on works, except in the case of Mechanical Engineers, who will spend the whole period in the shops.

4. These new rules, which are alluded to in paragraph 7 of the note, though nominally in force from 1st January 1886, do little more, I am bound to say, than exist on paper, so far as the amplification of the college courses proper is concerned. Their introduction is dependent on a substantial reinforcement of the staff, and on the extension of the existing buildings. The Madras Government has sanctioned the proposals submitted under these heads; and I understand that the scheme now awaits only the sanction of the Right Honourable the Secretary of State. No arrangements have yet been made with the Railway and Public Works Shops (*vide* paragraph 70 of the note) for the reception of college students, as the first batch will not have completed their theoretical course until the end of 1888. It is hoped that the first-named shops may be utilised for the Engineer classes, and the latter be reserved for the Engineer Subordinates' class.

5. Referring to the table given under paragraph 13 of the note, I would remark that of the total attendance of 106 under "School Education," some 50 students, being matriculates, would, if the institution were situated in another presidency, be classed as receiving University education. At Seebpur and Poona, the University Matriculation examination is the standard for admission to the Engineer classes. At the Madras College, it forms the standard for admission to the Engineer Subordinates' class; the senior classes being open only to First Arts men and graduates. The following are the classes now under instruction:—

| Nature of education. | Class. | Standard of admission. |
|---|---|---|
| College education | Engineer classes | First Arts examination. |
| School do. | Do. subordinates' class | Matriculation do. |
| | Draftsmen's class | Middle school do. |
| | Surveyors' do. | Do. do. |

6. With regard to paragraph 73 of the note, I remark that the Madras College is the only presidential institution which has classes for Draftsmen and Surveyors. These classes, especially the former, are popular, and it is not unusual to find matriculates applying for admission to them. Passed draftsmen are in great request; and the surveyors appear to have little difficulty in

obtaining employment. The Madras Survey is now looking to the college for material for its higher subordinate appointments.

7. It is in contemplation to establish a class for sub-overseers and maistries. See Article V (5) of the rules; but its inauguration must await the provision of further accommodation.

8. In conclusion, I beg to express the opinion that, when the new organization comes into full operation, this college will be in a position to afford as sound an engineering training as can be obtained in England.

*Note by the Chief Engineer, Public Works Department.*

It seems only necessary to add to the accompanying letter from the Principal, College of Engineering, that the introduction of the new rules, which provide for the practical training of students of the Engineer and Subordinate-Engineer classes, is dependent on the reinforcement of the staff and the extension of the college buildings. The proposals for increasing the staff are awaiting the sanction of the Secretary of State, and the extension of the buildings has been sanctioned by Government, but owing to financial pressure no funds are available for commencing the work.

(Signed) J. O. HASTED, *Colonel, R.E.*,
*Chief Engineer, Public Works Department.*

*The 22nd October 1886.*

No. 850, dated the 19th March 1887.

From—W. H. WILSON, Esq., PH.D., Registrar of the University of Madras,
To—The Chief Secretary to the Government of Madras.

With reference to G. O., No. 604 (Educational), dated 18th September 1886, referred to the Registrar, Madras University, under endorsement, No. 1817-C., dated 29th October 1886, along with the "Note on technical education in India," I am directed by the Syndicate to inform you that the subject, in their opinion, is one too extensive in its nature to be profitably discussed by them, but that certain of the points raised might suitably be referred to the different Faculties which they concern—a course which they propose to adopt.

2. With regard to the important question of the bifurcation of studies at a stage lower than the Matriculation standard, which is one of the suggestions contained in the note, the University can only interest itself in a proposal of this nature if both courses lead up to higher university examinations, and eventually to degrees. The Education Commission, in recommending the introduction of a course of study alternative with, but different in character from, that pursued for the Matriculation examination, considered that this course should *terminate* with an examination of a standard about equal to the Matriculation, and never contemplated it being or becoming preparatory to a university curriculum. With a course of this nature, the University can scarcely be expected to concern itself.

ORDER—dated 6th May 1887, No. 238 (Educational).

The views of the different Faculties will be awaited. Meanwhile, the papers read above will be forwarded to the Madras Chamber of Commerce, the Madras Trade Association, and the Committee of the Technical Institute, for the favour of an expression of their views.

## 7(c).—*Victoria Technical Institute, Madras.*

From G. L. CHAMBERS, Esq., Honorary Secretary, Victoria Technical Institute, to the Chief Secretary to Government, dated Madras, 4th August 1887. **No. 7(c). Victoria Technical Institute, MADRAS, 1887.**

I have the honour to inform you that G. No. 238 (Educational), dated 6th May 1887, and your reminder No. 46-R., dated 14th July 1887, have been laid before the Chairman and the committee nominated for the purpose of drawing up a scheme for the Technical Institute, and I am now directed to submit the following remarks.

2. The Government order in question relates back to another order (No. 604, 18th September 1886), from which it appears to have arisen out of a memorandum on the subject of technical education in India prepared in the Home Department of the Supreme Government. But that memorandum has not been communicated to this committee, and without it they regret that they find themselves unable to afford any useful observations as to the value of the suggestions which it contains, or the best means of giving them practical effect and development.

3. The papers, however, disclose one proposal from which the committee are prepared at once to dissent, *viz.*, the proposal to hand over technical examinations to the University. They object to the University having anything to do with Middle School examinations or any examinations below its own Matriculation, and are of opinion that technical education should continue, as now, under the control of Government, until it becomes practicable to transfer its control to the council or governing body to the Victoria Technical Institute.

No. 7 (c). Victoria Technical Institute, Madras, 1887.

4. The views of this committee as to the lines on which the Institute should commence operations have been formulated in a report and series of resolutions, of which I am directed to enclose a copy for the information of Government.

## ENCLOSURE.

### VICTORIA TECHNICAL INSTITUTE.

1. *Resolved*—To recommend that a representative council be appointed by the subscribers to establish and manage the proposed Technical Institute, and its operations, and generally to encourage technical education, and that such council be legally incorporated as may be deemed advisable.

2. *Resolved*—That it would be the duty of the council—

(a) To institute exhibitions of the work done by pupils of technical and industrial schools and of apprentices from regular workshops, and to grant certificates and prizes to the exhibitors.

(b) To form a museum to aid in technical education.

(c) To provide for lectures and class instructions in technical subjects.

(d) That with a view to extend as widely as possible the benefits of technical education among the native artizans, the institute should establish vernacular classes at one or more convenient places for instruction in mechanical drawing, rudimentary arithmetic and details of design in the various trades of the country.

(e) To assist the managers of high and middle schools in introducing instructions in the technical subjects of the Middle School examinations and the higher examination in arts in such ways as may be found practicable.

3. That as a commencement a small building should be bought or hired in a central situation for the head-quarters of the Institute.

4. That a library of selected technical works should be established in it to be kept open both very early in the mornings and late in the evenings, so as to be available for artizans out of working hours.

5. *Resolved*—That a beginning should be made by establishing at the said building a mechanical drawing class in the evening with teaching both in English and Vernacular, and that a course of evening lectures should be commenced in working trade subjects.

From J. ADAM, Esq., M. A., Acting Secretary, Victoria Technical Institute Committee, Madras, to the Chief Secretary to Government, dated Madras, the 6th September 1888.

I am desired by the Honourable P. P. Hutchins, C.S.I., Chairman of the Committee of the Victoria Technical Institute, to lay before His Excellency the Governor in Council the present financial position of the committee, and to request that His Excellency the Governor in Council will be pleased to make a substantial grant-in-aid of the funds of the committee.

2. I am desired to point out the present status of the committee, and to briefly indicate the proposed course of action. At the final meeting of the Madras Jubilee Committee held at the Banqueting Hall on 2nd December 1887, the following motion was carried unanimously :—

"That the existing committee of the Victoria Technical Institute consisting of the following gentlemen (here follow 158 names) with power to add to their number, be requested and empowered to continue to act in all matters connected with that Institute and to take such measures as may seem to them desirable to constitute it on a legal basis and provide it with a permanent governing body."

Under this delegated authority the committee now exists. It is proposed that the Institute should be registered as a Company carried on, not for the purpose of gain, but for the promotion of science, art and industries, and that it shall be governed by a council consisting (1) of representatives the subscribers, (2) of nominees of Government. The proportion of these two classes of members would be fixed by Government, with reference to the amount of grant which Government may be disposed to give.

3. To enable the Institute to be thus constituted on a legal basis and to provide the permanent governing body, it is proposed to appoint a provisional council. The Chairman proposes to request the committee, at a meeting to be held in October next, to select 12 of their number, who in concert with such others as may be nominated by His Excellency the Governor in Council, shall take the necessary steps for starting the institute and placing it on a permanent footing.

4. The funds at the disposal of the committee are so small, that any Government contribution will form an important item and will much influence the plans to be adopted ; and it will further be necessary to know what conditions, if any, would be attached to the contribution of Government if given. It is for these reasons I am desired now to beg that His Excellency the Governor in Council will be pleased to give early consideration to this request.

5. The funds at the disposal of the committee are as follows :—

| | Rs. | a. | p. |
|---|---|---|---|
| Amount at credit of the Victoria Technical Institute with Messrs. Arbuthnot & Co., with interest accrued to 31st August 1888. | 72,052 | 10 | 2 |
| Donation by Rai Bahadur A. Dhanakoti Mudalliar specially for library with accrued interest. | 20,774 | 3 | 11 |
| Amount in hands of Mangalore Jubilee Committee specially allocated for the payment of scholarships in the institute | 12,000 | 0 | 0 |
| | 1,04,826 | 14 | 1 |

The above amounts are actually paid. There is in addition a sum of R10,000 promised by Rai Bahadur Arcot Dhanakoti Mudalliar to be paid at an early date, and a further sum of about R6,000 miscellaneous subscriptions promised, but not paid. Most of these, however, were subscribed to be paid in instalments spread over a series of years, and are not therefore to be treated as irrecoverable. If this last amount be taken at R5,000, the total visible resources of the Institute amount to R1,19,826-14-1.

**No. 7 (e). Victoria Technical Institute, MADRAS, 1888**

6. I have, therefore, to express the hope that His Excellency the Governor in Council will see fit to grant this application and to supplement the sum at the disposal of the committee by a grant proportionate, not to the amounts subscribed, but to the worthiness of the object on which it is to be expended.

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ORDER—dated 15th September 1888, No. 546 (Educational).

The Government are prepared to contribute a sum equal to a moiety of the private subscriptions up to a maximum of half a lakh of rupees, but such special contributions as that of the Mangalore Jubilee Committee cannot be taken into account. The other sums mentioned by Mr. Adam come to R92,826, and the Accountant-General will at once pay to him half that sum, or R46,413, to be debited to 26,—Scientific and Minor Departments.

2. The only conditions which His Excellency in Council considers it necessary to impose are that the nomination of the Chairman or President and of one-third of the members of the Executive Council shall be reserved to the Government; and that an annual report of the working of the Institute be submitted to Government through the Director of Public Instruction. The Government members will be nominated from time to time after the other members have been elected.

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## MEMORANDUM ON THE PROPOSED VICTORIA TECHNICAL INSTITUTE.

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1. As a member of the " Victoria Technical Institute " Sub-Committee of the General Jubilee (Madras) Committee, I had the honour to submit along with the Report of that Sub-Committee a minute on Technical Education. The object of that minute was not to dissent from any of the specific recommendations of the Sub-Committee, with all of which I heartily agree. The resolutions, however, which are printed at foot for convenience of reference,* appeared to me to be unsatisfactory considered as the "*practical scheme*" that it was the duty of the Sub-Committee as I read its instructions, to submit to the General Committee. Some are vague, while others, which cannot be accused of vagueness, yet give no indication of the practical steps necessary for carrying out the recommendations contained in them. But the main defects are two; first, the various suggestions however good are mere isolated parts of what ought to be a comprehensive and connected scheme. No such general scheme or plan is formulated, although it would appear to be absolutely essential. Secondly, there is no reference at all to the question of finances. Proposals that are totally oblivious of the difficulties of ways and means cannot claim a highly practical character. The object of the minute referred to was, then, first to call attention to the monetary difficulty : and, secondly, to show how far the Sub-Committee's proposals might be dovetailed into a general scheme. The present Memorandum is merely an expansion in greater detail of the views therein expressed.

2. In developing these views, I have kept in mind certain indispensable considerations of a restrictive nature, which I here briefly state at the outset.

(*a*) The funds at the disposal of the Committee are very limited, and accordingly it is less important to consider what we should *like* to do, than to discover what we *can* do. It follows that the popular idea of a Technical Institute, namely, a spacious public building, filled with machinery and technical apparatus of all sorts, manned by able experts, and turning out highly trained specialists, is at present a chimæra.

(*b*) If special technical instruction of the most approved type were provided, the material on which it could work does not exist in the country in any appreciable quantity. The educational system now in vogue does not turn out pupils with either the liking to adopt, or the aptitude to sprofit by, high Technical Instruction ; and humbler but very useful work must be performed before high-class Technical Instruction can be appreciated by any but a small minority.

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* I. That a representative Council be elected by the subscribers to establish and manage the proposed Technical Institute and its operations, and generally to encourage Technical Education ; and that such Council be legally incorporated as may be deemed advisable.

II. That it would be the duty of the council—

(*a*) To institute exhibitions of the work done by pupils of Technical and Industrial Schools and by apprentices from regular workshops and to grant certificates and prizes to the exhibitors :

(*b*) To form a museum to aid in Technical Instruction :

(*c*) To provide for lectures and class instruction in Technical subjects :

(*d*) With a view to extend as widely as possible the benefits of Technical education among the native artisans, the institute should establish vernacular classes at one or more convenient places for instruction in mechanical drawing, rudimentary arithmetic, and details of design in the various trades of the country :

(*e*) To assist the managers of High and Middle Schools in introducing instruction in the Technical subjects of the Middle School Examination and the Higher Examinations in Arts, in such ways as may be found practicable.

III. That, as a commencement, a small building should be bought or hired, in a central situation, for the headquaters of the institute.

IV. That a Library of selected Technical works should be established in it, to be kept open both very early in the mornings and late in the evenings, so as to be available for artisans out of working hours.

V. That a beginning should be made by establishing at the said building a mechanical drawing class in the evening, with teaching both in English and Vernacular and that a course of evening lectures should be commenced in working trade subjects.

(c) It follows from this that the work of an Institute to be now started must be progressive: it must begin with small things and proceed by indirect methods. It may contemplate much: its aims should be to consolidate, co-ordinate, extend, supplement, and popularise existing agencies to form the link between purely professional or technical institutions and general educational establishments; to develope an interest in these special subjects among the population generally and to seize any opportunity that offers for the improvement, resuscitation, or introduction of particular industries. But the way to achieve much is, not by attempting to do everything at once, but by having an elastic constitution in which a place will be found for everything as the work grows and opportunity for expansion offers. There should not therefore be disappointment though the enterprise at first seem insignificant. If the Institute, however small its beginning, makes good its ground as it goes, it will, slowly perhaps but surely, rise to greater things.

(d) It is important that any scheme proposed should harmonize and work in with existing agencies. Some of these it may indeed absorb, but to begin with a declared course of antagonism would be fatal.

(e) The Institute must endeavour to earn as much Government money as it can. The full meaning of this will appear in the sequel. It does not refer to special grants, which may be reasonably expected, but to the grants which Government has promised to technical education under the Grant-in-aid Code. In other words it will be the duty of the Institute to work in accord with the Educational Department or to persuade the Educational Department to work in accord with it.

If the soundness of these considerations be granted, it follows that the immediate scope of operations will be substantially limited.

3. *Constitution.*—In the name, the Victoria Technical Institute, the word Institute should be taken to signify, not a building, but the associated members, as in the Royal Colonial Institute, the Royal Institute of British Architects, etc. It should be incorporated under section 26 of the Act No. VI of 1882, as a company carried on, not for profit, but for the advancement of Science, Art and Industries. The members should be—

(1) All subscribers of not less than R50 per annum, membership to cease when the subscription ceases; and

(2) Life members, being all such as contribute R500 either in one donation or in payments extending over a period of not more than five years.*

The Institute so formed may have a President and Vice-President, but the main work would be done by the Council of the Institute.

4. *Council.*—The Council should consist of :—

(a) Members elected by the Institute. They should be elected for three years, one-third of the number retiring yearly.

(b) Members to be nominated by Government.

Both the proportionate and the absolute numbers of the two classes of members must depend to some extent upon the amount of aid given by Government; but assuming that that aid will be fairly liberal, the number of elected members might be twelve and of nominated members nine. This would make a total executive Council of twenty-one, which is sufficiently large to ensure a working quorum and sufficiently small to ensure that only those who show some considerable interest in the work shall gain admission. This Council will elect its own Chairman and its Secretary, the latter of whom may or may not be a member of the Council. It will be essential to have a paid Secretary; for there will be a considerable amount of detail work which no one can be expected to undertake, or undertaking, to carry out promptly and efficiently, without some remuneration. The resources will not at present admit of the engagement of a Secretary, of sufficient ability and experience, to give his undivided attention to the duties of the office; but probably some one could be found willing for a moderate remuneration to devote a portion of his time regularly to the work. The Secretary would correspond somewhat to the Secretary to the Commissioner for the U. C. S. Examinations or more nearly to the Registrar of the University.

5. *Funds.*—The Funds at the disposal of the Institute are :—

(a) The General Fund, which, with accumulated interest, will amount to something over R60,000 by the time operations can be commenced. We may take it at R60,000, leaving any small surplus for preliminary expenses.

(b) The sum of R20,000 given by Rai Bahadur Arcot Dhanakhoti Mudalliar for the purposes of a Library.

These two amounts come to R80,000. The whole of this should be treated as capital to be expended on buildings or to be funded. To supplement this fund, advantage may be taken of Chapter X of the Grant-in-Aid Code, Buildings, and of Chapter XII, Endowments.† Under the

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* It may subsequently be found possible and advisable to give subscribers certain privileges in the way of recommending pupils for tuition or scholarships, etc.

† Grant-in-Aid Code, Chapter XII.

1. Grants equal to one-half the amount given or devised may, with the sanction of Government, be made for the endowment of professorships, teacherships, scholarships, museums, or other definite object approved by Government subject to the following conditions:—

(1) The institution with which the endowment is to be connected must be of a well-established and permanent character, and must be under management recognized by Government as suitable for receiving such aid.

(2) The endowment must consist of Government securities and be invested in the names of three trustees approved by Government, or with the sanction of Government, invested in the names of the Director for the time being.

(3) The trustees must render yearly accounts to Government in such form as may be prescribed and a statement of such accounts shall be published annually by the Director in the *Fort St. George Gazette.*

(4) The proceeds of endowments shall appear in the annual accounts rendered by each Manager to the Director.

circumstances, Government would probably gladly sanction the one-half grant therein contemplated. This would give a total of R1,20,000. Of this R75,000 should be invested in the names of the approved trustees, giving a minimum yearly income of R3,000. This is not a large sum, but it will defray office and other current expenses and support the machinery by which in time more may be collected. The balance of R45,000 should be devoted to buildings and the purchase of books for the library.

6. *Buildings.*—It may be possible to rent on lease, at a reasonable rate, suitable buildings, but failing any special arrangement (such as that proposed in paragraph 29 of this memorandum), a building of some short will be necessary. A site in a suitable central situation can probably be obtained from Government or the Municipality. The building must be unpretentious but specially adapted for its purpose and capable of extensions. Probably the best model would be that of a central building with detached, or semi-detached, wings. The central building would contain the offices of the Institute, a lecture theatre, and one or two smaller class-rooms. One wing, to be built at once, would contain the library, which would also be used as a reading room, as in the British Museum. A corresponding wing would form the Technical Museum, but this could not be proceeded with in the absence of funds. Further additions, in the way of laboratories, workshops, etc., could be made as the operations of the Institute become wider and its funds more ample. This system of detached blocks (which might be connected by covered ways) serves three good ends. It enables the work to be proceeded with gradually ; it enables specific donations to be devoted to special buildings, which may receive the names of the donors; and it is a great insurance against total loss in case of fire. The last is a very important consideration when it is remembered that much of the work of the Institute must be carried on at night and also that many industrial processes, requiring the employment of fire, will in course of time be introduced.

7. *Income.*—The Annual Income will consist, in addition to the fixed sum of R3,000 mentioned in paragraph 5, of subscriptions and donations. Subscriber, and donors will probably when the sums are large, indicate the specific objects to which they wish their contributions to be devoted. Where no such intention is indicated, it might be well to observe some general principle as for example, that all donations of R500 and upwards be treated as capital and invested ; while smaller donations and annual subscriptions be treated as income. Donations added to the endowment would be increased by the half-grant from Government under the Grant-in-Aid Code Chapter XII. With regard to annual subscriptions and donations treated as income, some special arrangement will be necessary. Government might be moved to consent to an arrangement similar to that adopted in the cases of the Physical Training and Field Games Association, the Friend-in-Need Society, and other bodies : namely, to give an amount equal to the subscriptions up to a certain limit. The limit would in this case be the maximum amount which Government can see its-away to contribute as an annual subsidy.

8. In addition to the serious work of the Institute, something may be done at its central building to popularise Technical Instruction and make the people familiar with its aims and benefits, Two useful means to this end will be the Library and Museum,* but courses of popular lectures

2. The trust-deed, which must be approved by the law officers of Government, shall contain a provision that in the event of the object for which the endowment was created ceasing to exist or of the Manager of the institution with which the endowment is connected ceasing to comply with any condition of the trust, the fund shall be distributed as provided therein.

3. Grants will be given only towards endowments on or after the 1st July 1885 created by one or more private persons from their own property.

In no case shall a grant be given towards an endowment to be created from funds derived directly or indirectly from ordinary, unded or school income, from any corporation, society, body of trustees or individual acting on their behalf, the object of Government being to encourage endowments in good and efficient institutions by means of the liberality of private persons.

*A popular and instructive adjunct to the museum would be the presence of skilled workmen, carrying on their work by the most approved methods. This suggestion is due to Raja Sir T. Madhava Rao, who writes to me as follows : —

" The plan is to place before the existing industrial classes examples of model workmen doing work with the best tools and the best materials and with the best trained skill so that useful instruction may be had by the mere inspection of the model workmen. By such means, the best tools will become known and so also the best materials and the best skill.

" A small fee may be charged for the inspection.

" Arrangements may also be made to procure and give at cost price any tools which may be approved and required.

" Arrangements may also be made to exhibit samples of the best work on the best designs.

" The cost of giving effect to this plan will be moderate and within the means at present command.

" The plan is simple and intelligible and will be an important step in the right direction.

" Practical workmen will come from all parts of the Presidency and visit the proposed establishment and carry away a better knowledge of tools, materials, designs, and trained skill so as to improve the already existing industries.

" I append a rough list of industries and processes which might thus be improved.

" Improvement thus started will naturally further develop. If such a model establishment existed, I would, for instance, ask the Dewan of Travancore to send up at the cost of the Travancore Government a number of carpenter maistries of that country.

" Travancore is so rich in timber of all sorts and in clever carpenters that it might be the supplier of beautiful furniture of all kinds to India and also to countries outside. But the Travancore carpenter has rude implements, rude designs, is deficient in finish, does not know how to varnish work, etc.

" Such examples might be multiplied without limit.

" Memorandum of trades and industries to be taught by best example and the best instruments :—

" (1) Carpenter's work, (2) Blacksmith's work, (3) Hand-loom weaving, (4) Lucifer match making, (5) Turning in wood and metal, (6) Toy making of different kinds, (7) Pin making, (8) Lock making of different kinds, (9) Wall paper printing, (10) Cloth printing, (11) Needle making, (12) Mat making, (13) Shoe making, (14) Tanning of leather, (15) Cask making, (16) Cutting of metal plates to required shapes and dimensions for the making of different kinds of vessel, (17) Umbrella making, (18) Carving figures in soft wood as in Switzerland, (19) Cut designs by the fret saw, (20) Casting of metal figures in given designs, (21) Mason's work, especially building up of walls, (22) Brick and tile making of different kinds, (23) Manufacture of playing card, (24) Making of penknives (very fine steel is available in different parts of Indian), (25) Grinding fine flour of different kinds, (26) Tinman's work, (27) Whip-making, (28) Work of different kinds in horn, (29) Work of different kinds in bone or ivory, (30) Gilding, electroplating (31) Gilding on wood, (32) Dye and colour manufacturing, (33) Manufacture of perfumes useful for export, (34) Ink-making (35) Gold and silver thread manufacturing, (36) Soldering of different metals, (37) Tape manufacturing, (38) Twine manufacturing, (39) Sack manufacturing, (40) Bamboo basket making, (41) Rattan manufacture, (42) Coir making (43) Honey bee rearing, (44) Brush making, (45) Wax cloth making, (46) Bead and bangle making, (47) Wire, making, (48) Nail manufacturing, (49) Making of playing marbles, (50) Making of glass bottles from broken material is procurable in India, (51) Making of cardboard from waste paper procurable in India, (52) Manufacturing of porcelain inkstands, (53) Making of fans with peacock's feathers, (54) Resilvering of mirrors, (55) Making of pill boxes, (56) Selecting, packing, and exporting medical drugs, (57) Preparing, bottling, and exporting various jams, syrups and pickles, (58) Artificial flower making for export, (59) Showing the best methods of polishing wood, metal, and stone things.

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may be delivered, and classes for special subjects formed, as soon as lecturers and teachers are available. But action in these matters must be guided by circumstances and no fixed rules can be laid down.

9. Technical Instruction naturally divides itself into two distinct branches broadly defined as the General and the Special. *General* Technical Instruction means the training of the whole body of school-going children in one or more of those branches which are fundamental or necessarily preliminary to all instruction treating of the application of these branches to particular trades or industries, the latter forming *Special* Technical Instruction. Thus all the decorative arts, painting, modelling, engraving, jeweller's work, embroidery, etc., are special applications of design, and it would be useless to admit a pupil into a class for any one of these subjects, who had not attained a certain proficiency in freehand drawing. In the same way, an elementary knowledge of geometry and mechanics is essential to the student of mechanical engineering; some acquaintance with chemistry and botany is a necessary preliminary to a study of agriculture, forestry, horticulture, and allied branches. I shall in a subsequent paragraph recur to the special difficulties which, in Madras, prevent at present the introduction of any extensive scheme of *special* technical instruction, but it is here necessary to point out that, however much money or however much knowledge we might have, all efforts would be futile in the absence of suitable material. I think these two statements may be taken as incontrovertible, (1) that suitable material is essential, and (2) that we have not got such material in Madras—or in India. Some may contend that we have material in plenty, but it cannot be admitted that either illiterate workmen or literate school-children form suitable material. Little, if any, direct good will accrue from attempts to improve the workmen of this generation. They are wholly illiterate, their technical skill, great as it often is, is the result of an hereditary instinct combined with long rule-of-thumb practice; and it would be utopian to expect them to adopt the more scientific, time and labour-saving, and therefore more remunerative, processes of modern days. All we can hope to do is to awaken their interest and, convincing them of the practical benefit to be gained, induce them to procure for their sons the educational advantages of which they were themselves deprived. With regard to our school-children the case is very different. Possessing a certain amount of general education, they only require to have that education supplemented or expanded by training in the fundamental branches already mentioned. Students thus taught are able to take up and develop any branch in which these principles are applied, they become in fact in the words of Mr. Leland, quoted below, "qualified learners."*

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* The importance of a preliminary course of *General* Technical Instruction is so great and is so little appreciated by the general public that I may be excused for adding, as explaining and enforcing these statements, a few extract from a recent work, "Practical Education" by Mr. C. S. Leland. Mr. Leland, who has had great practical experienced, was one of the pioneers of this subject in America. He specially confines himself to Design and its applications, but his principles are quite general. His methods are adopted in thousands of schools in the United States under the auspices of the Government Bureau of Education, and have been introduced into Austria by the Minister of Education. They are also followed in many schools in England.

"The great question in education at present is: Can children while at school be trained to practical industry? Can their minds be more fully developed? Can they, while learning to read, write, and cipher, be taught a trade, or fitted for some calling, so that on leaving school they may be prepared to work, and if possible gain a living? . . .

"It was very natural for the 'practical' man, when this question arose, to attempt to settle it in a practical manner. It seemed to be a very simple thing to teach a boy to read or write for three hours, and then keep him for the same time at shoemaking, carpenter's work, or printing. It was tried but with very little success. It is remarkable that so much money and labour should have been spent, to prove that mere children cannot perform men's work, or even be trained *directly* to most trades. The farmer knows that a colt cannot be put in harness or worked, though even during colthood the animal may be prepared in Arab fashion by gentle care or culture for training. But it does not seem to have been known to most men that a human colt is subject to precisely the same conditions. The result of the faith in teaching trades to children was the establishment of technical schools. And the result of the teaching has been that so far as the training in these has been *purely practical*, technological, or aiming at a mechanical calling, it has only fully succeeded with vigorous boys at least fourteen years of age. And it is no great discovery that a boy can begin at that age as an apprentice to *any* hand-work. It has also been found that the industrial or technical school proper *costs a fortune to establish, and is only available for the youth in cities or large towns*. And the problem to be solved is. 'By what system can *all* children, girls as well as boys, both in town and in country, in school, or possibly at home, be trained from infancy to industry? . . . .

"We will suppose then that it is desired to train a child to industrial pursuits. These are broadly and generally to be classed as agricultural, artistic, economical, and commercial. Under 'artistic,' I include all manufacturing or technical work whatever; under 'economical' all housekeeping and administration of affairs; and under housekeeping again all that pertains to the domestic support and comfort of life. In a broad sense there is no human occupation for which some provision may not be made in education. But I am writing now especially of hand-work and I would declare that there is no division of it which may not be made to a certain extent familiar to the young, and the key to it is simply to call attention to and awaken interest in an industry. It is to make the pupil *think* about it. This sounds extremely commonplace, but it is as far from being generally understood or appreciated as any idea can well be. . . .

"There are many boys destined to become farmers who are made to think of the *details* of agriculture, such as ploughing and sowing, but very few who think of it as a study, or as a whole.

"Now I venture the assertion that if the boy who is to be a farmer were induced to study a manual written in the simplest attractive style, teaching of farming *as a whole*, he would study the practical details with greater interest. Experimental gardens or farms would in many places aid in such education, but where this is not possible the farm itself would serve as well, and, as many would think, even better. The initial point lies in making the boy feel that farming is an art alied to science, that it is interesting, that it does not consist intending cattle, or ploughing or in any details, but in all of these, and the difference between the farmer as a leader and the mere labourer consists of really understanding this. The false ideas of the dignity of being above work, or the indignity of labour, are due in a great measure to the fact that industry has never been properly taught as an art or as a science. To the man taught only to dig, without a hope of rising by his general knowledge above this detail, farming appears naturally enough low and coarse. Train him to regard it as a career with many stages which he comprehends, and which because he comprehends them, he may surmount, and his calling equals in 'dignity' any other. This is therefore that which corresponds to design in the industrial arts, that boys in country schools shall be trained to think of farming as a study, and this primarily by means of agriculture. For design, as its very name implies, is *fore*thought. . . .

"There is no industry which is without its rudimentary design. At present nineteen boys out of twenty go into business,' or to shops or callings of any kind, without the least previous training. . .

"He can be made to take an interest in any industry. His attention may be called to it. Let those who object to this first try the experiment. If the method has succeeded in industrial art, I do not see why it should fail in agriculture and commerce, or in housekeeping. . . .

"There is much needless confusion at present as to industrial education. We hear of cooking schools here art schools there, farm and mechanical and wood carving schools everywhere. What is needed is a co-ordination of these forces, a recognised principle and point of departure. This will be found in mastering certain principles which this book is intended to set forth. The first of these is that from the very unfolding of constructive ability in the Kindergarten method, which is too generally known to require explanation, up to the industrial school with its advanced technological training, there are successive steps, and that these are, firstly, design, or the attraction of the attention of a pupil to a calling as a study and as a whole; and secondly, his or her preparation, not so much to at once make a living on leaving school, as to be a *preferred junior workman or qualified beginner or learner in a factory, or in any 'business.'* The public expects a boy to be able to make a living or be fitted to begin some practical calling when he leaves school, let us say at fourteen years of age. And it can very often be done. But generally speaking all that I expect of my pupils is that the foreman of factories would give them the preference to other applicants for place. This always means more money for wages. . . .

10. The importance of thus supplementing an ordinary education by instruction in general Technical subjects has been long recognised, and perhaps the only point disputed will be how far it lies within the sphere of a Technical Institute to aid in the work. I think it sufficient to look at the matter practically, and to point out that though strong representations have been made to and by Government on the matter ever since the time of the Education Commission (to go no further back), and though all parties appear to evince the strongest interest in something being done, nothing has actually been done, nor is anything likely to be done until some such organisation as the proposed Technical Institute takes the matter in hand. I admit it is not the highest, final, or perhaps proper work of a Technical Institute to impart general instruction; but if there are no pupils so instructed, how is it ever to begin to perform its more special duties? I hold, therefore, that the most pressing present work of the Institute will be to encourage and assist the spread of *general* Technical Instruction. If this course be vigorously followed for some years, it may be hoped that other agencies will take up and carry on the work, leaving the Institute free for its proper duties and in no lack of suitable material.

11. The course which the Technical Institute ought to pursue is plain. Appreciation by the Local Government of *general* Technical Instruction has shown itself in the institution of examinations in such subjects as Drawing, Modelling, Mensuration, Agriculture, and Botany in the Middle School Examination, and of the Higher Examinations in Science, Art and Industries; and also by the promise of exceptional grants to schools or classes specially devoted to the teaching of these subjects. In spite of all this, progress is almost imperceptible. The schools of the Presidency generally have held aloof from the scheme.* The reasons are obvious.

(*a*) The business having hitherto been everybody's business has ended in being nobody's business. Managers of ordinary schools have had no object in striving to entice their pupils from the beaten track, and ordinary pupils have seen no advantage in taking up extra and non-paying subjects. Here and there an enthusiast, who is looked upon as a sort of harmless lunatic by his fellow-students, has wandered from the high-way; but these stragglers are few and they have no following. If the proposed High School Examination be introduced, this state of things will be to some extent modified. The effect of that examination, however, upon Technical Education will be only indirect (though so far good) and not perhaps so great as anticipated. Candidates will soon find out the subjects easiest to pass in those most akin to their other studies (*i.e.*, the most bookish and literary subjects), and those most valuable in the office.† But nevertheless much will be gained when the pupil can be told that in learning Drawing, or Botany, or Engraving, he is not spending his time on a useless luxury, but on something practically useful for the examinations for which he is preparing.

(*b*) Teachers have not been available. There being no demand for instruction of the kind indicated, naturally few teachers care without some special encouragement to qualify themselves to furnish it.

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"To arrive at this co-ordination certain rules must be followed. We begin in my schools by teaching design. After this every pupil takes up one or more applications of it, as they are guided by circumstances. One thing is certain that after working, seeing others work, and becoming familiar, or at least acquainted with half a dozen arts, their taste is cultivated, and all realise that they can, if they choose, turn their hands to and master many things—*in fact they have acquired that confidence in their own abilities which makes them sure to succeed in any kind of work.*

"Now the basis of all familiarity with all industry, be it agriculture or art, is to first set the pupils to thinking about it as study, and then to show it to them in practical operation. They must first learn a theory, or general principles, for example *design*, and then its application. Those who think that because we work from design that our work is necessarily of an "æsthetic" sun-flower kind greatly err. For when a boy can use his hands and brains to guide them, or in fact becomes a practical workman in any form, he can work if he will in many ways. I may say in all. *In every school in the country, every teacher should make industry a theme for instruction. From industry and its importance he may proceed to its sub-divisions, to agriculture or art, business or household economy.* When this beginning shall have been made, the practical teaching of all branches of manual labour will follow in due place, time, and course. How one of the most important can be realised (I refer to industrial art), I will now explain. . . .

"Many years ago I began to think seriously on the question of training the young to hand-work while yet at school. The possibility of teaching 'trades' to children was dismissed almost as soon as I considered it. PESTALOZZI had attempted it; it had been tried in every country in Europe, and very earnestly supported in America, and it had nowhere really succeeded. The cause was not hard to find. Had it been a success, the employment of little children in factories would also have been a success. It is true that this infamous branch of human sacrifice, prohibited by law in England, still common in Massachusetts, and, I am told, in other American States, but it is none the less inhuman on that account. That something could be done, in a small way, in this direction, no one can doubt. But it was always a false growth.

"While the minor arts, guided by even a slight knowledge of decorative design, are so easy as to be regarded by all children as a recreation, they are at the same time of practical value in training the eye and hand, and awakening *quickness of perception.* They aid all studies and all work. I would here call the attention of the reader to the chapter devoted to this, as a separate branch of education. There have come under my observation many instances in which I have found that beyond all doubt, children who have been regarded as dull in everything have shown great aptness and ingenuity in designing, modelling or carving. When such skill is once awakened, there comes with it greater cleverness in those studies or pursuits in which the pupil was previously slow, *because he has begun to think* about *himself* and believe that he can do something. It is a great truth, too little studied, that sluggish minds can be made active even by merely mechanical exercises. And the practice of the minor arts by children effects this to a remarkable degree. Yet while everybody is quick to observe mental ability or activity when it is transmitted from progenitors, very few notice the innumerable instances in which it is incidently developed by education or circumstances. It is a matter of fact and observation that children who practise decorative arts or any manual arts, are thereby improved mentally and morally. The consciousness of being able to make something of value inspires pride and confidence in their ability to master other studies. *For these reasons I believe that industrial art should rank in education next to reading, writing, arithmetic, and geography, or rather with them, since it conduces to mental development*, and that it should precede music and the other studies which are urged as 'essential.'"

The italics in the foregoing extracts are mine, not the author's.

* I do not allude to orphanages and other useful industrial institutions of that class as they lie in a category by themselves.

† To venture on prophesy, I should say the most popular subjects will be, Mathematics, Mensuration, Book-keeping and Correspondence. Inorganic Chemestry and Physiology will also be selected, because, being already compulsory subjects for the University Examinations, most Institutions possess the necessary apparatus, and many graduates are qualified to teach them.

(c) And thirdly, though the offers of the Grant-in-Aid Code (Chapter V., etc.) appear superficially to be liberal, the restrictions are so severe and the conditions so onerous to be practically prohibitive.*

12. The object of the Technical Institute should be to remove, or render nugatory, those reasons.

(a) It should make it its object to overcome the apathy of managers by encouraging the establishment of classes in drawing, etc., such encouragement being both moral and pecuniary; and where this endeavour fails, the Institute should itself assume the position of manager, establish its own classes, obtain recognition by the Department and draw the grants earned. Gradually school managers will come to recognise their duties, when the Institute will be able to withdraw from this field and devote itself to its more special work.

(b) The Institute should endeavour to provide qualified teachers. And to do this it should endeavour to utilize the existing stock of teachers. If we are to wait until we have on the one hand specialist teachers and on the other school managers willing and able to employ them, we shall have to wait for many years before this class of instruction spreads beyond a few of the very largest schools. But if every teacher in our ordinary schools, or even one in each school, be qualified to teach drawing, or agriculture, or carpentry, or some other special subject, and be encouraged in ways to be presently mentioned to open a class in such subject as an addition to his ordinary work, then we may expect to find at a very early date one or more technical classes in every school in the country.† It may also be pointed out that the influence of these teachers will be certain to extend beyond the walls of the school-room. A body of educated men, possessing some knowledge of technical subjects, spread over the country, must produce a considerable influence on their neighbours and the community generally. They will educate not only their few peculiar pupils but the public at large. Every such teacher will be a veritable pioneer of Technical Education.‡

(c) The Council of the Institute, being absolutely natural and unselfish, would, as its experience increases, be able to point out to Government, with a force which no private managers could ever possess, the modifications which may be desirable in the regulations of Chapter V of the Grant-in-Aid Code. The next succeeding paragraph will show that the objects aimed at in that chapter are good and exactly such as the Institute would desire to attain; but it is doubtful if they ever could be attained by working under the restrictions imposed. It would obviously be of first importance that the various agencies of the Institute should obtain the Government Grants offered which might be supplemented from the funds of the Institute; but the conditions of the Code appear to have been framed as if it were dealing with a firmly rooted and long established system of education, instead of one which is unknown, tentative and requiring to be encouraged and fostered rather than chained down and repressed.§

13. For details of the work it is unnecessary to go beyond Chapter V of the Grant-in-Aid Code. The Council of the Institute would —

(a) Generally, endeavour to encourage Technical Education by the means enumerated in Section 2|| as opportunity offers.

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* I venture to suggest that the Grant-in-Aid Code requires considerable remodelling in the interests of Technical Education. The difficulties are hardly realized by the Department, simply because private managers do not attempt to face them, and the Code lies a dead letter. But if the work be taken in hand by the Institute, the practical modifications necessary will soon appear, and the Director of Public Instruction will probably be only too glad to profit by the experience of such an organisation. The main fault of the Code is that it proceeds on a vicious principle. It treats *general* Technical Instruction not as an integral part of an ordinary education, but as something extraordinary and special. Art and Industrial subjects must be taught in specially recognised schools and classes, with special fees, by extra-special teachers, etc.; in fact everything is done to frighten managers, teachers, and pupils. Again, it is almost impossible to calculate how much grant is earned, and always impossible to tell what proportion of the grant earned will be paid. The provisions of the Code appear, indeed, at times to be mutually contradictory; *e.g.*, compare Section 14 Chap. III with Section 4 No. IV, Chap. V.

† It may be pertinent here to mention that in Chengalvaraya Naicker's High School, which is simply the Technical side of Pacheappa's High School, we have classes (some very large, especially those held in the evening) in Drawing, Chemistry, Mensuration, Phonography, Book-keeping, and Commercial Correspondence, and all with the single exception of Drawing, are taught by the ordinary masters, who have taken the trouble to study and qualify in these special subjects. I may also point out that in only the largest institutions are masters specially employed to teach Physics and Chemistry for the Matriculation Examination. These subjects are taught by graduates who, having taken Science as their optional B.A. subject, teach Science as they do History, Geography, or Arithmetic.

‡ As a practical example, the case of the Irish National School-masters may be cited. These as part of their normal training had (and I believe have) to undergo a course of instruction in Elementary Agriculture. The benefits arising from this training was however seen, not so much in their book-teaching, as in the practical example set to the whole village by the careful and scientific cultivation of the plot of ground attached to the school house. The reports of the Irish Education Department testify to the great improvement in Agriculture thus brought about in many districts of the country.

§ A full discussion of the various educational problems connected with the Grant-in-Aid Code would be out of place here, but so much reference has been necessary because it is an essential condition of my proposals that the Institute must work hand-in-hand with Government if any great or permanent good is to be achieved. I may point out merely two questions of detail as illustration. Section 14, Chap. III of the Code says "a school cannot receive aid under the salary grant system for one department of the school, and under the result grant system for another, except that in results schools salary grants may be allowed for teachers of all special subjects (*i.e.*, drawing and industries), excluding language, provided that no result grant is claimed for any such subjects." This appears to be exactly the converse of what is wanted. Teachers in salary grants schools, drawing salary grants, should be permitted to draw results grants for pupils whom they may instruct and send up for examination in special subjects. Again in Section 5 (c), Chapter V of the Code it is laid down that, as a rule, "pupils admitted into Science or Art schools or classes must have passed the Middle School examination or some Examination accepted by the Director as equivalent or higher." I thoroughly uphold the principle that general and technical education should go hand-in-hand, but what hope is there for the technical side under such a regulation? Passed candidates do not as a rule want to be taught, and unpassed candidates are not permitted to be taught. The special subjects can also, for the most part be brought up only as *extras* and cannot be entered for separately. The practical experience of the Institute would soon suggest how these regulations might be modified without injuriously affecting other branches of education.

|| The means for attaining these general objects are:—

(i) In regard to science—

(a) the establishment of applied science classes and of museums, laboratories, demonstration farms and workshops in connection with existing recognized colleges and high schools affording general instruction, such science classes being optionally day or evening classes, and being available both for the ordinary pupils of the colleges and high schools and for outsiders;

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(b) Encourage ordinary teachers and normal students to attend Agricultural, Art, Engineering, or other Technical classes, and so qualify for teaching these subjects. The Council would give grants to such teachers or students, or supplement the grants earned from Government. The Council would endeavour to obtain appointments for such teachers in schools willing to give facilities for opening special classes, and the teachers or students should undertake, as a condition of receiving grants or scholarships, to open such classes on obtaining appointments. Where the school managers, while willing to give facilities for such classes, are unwilling to assume any responsibility in the matter, the Council would undertake the duties of managers and request to be recognised as managers by the Director of Public Instruction. It is unfortunate that the Government Institutions (the Agricultural College, the Engineering College, and the School of Art) are located at such inconvenient distances from each other and from the populous part of the town; but when the attendance of pupils increases, it should be easy to arrange for special and evening classes in the Institute building, where instruction could be imparted in the first instance by teachers from the afore-named institutions. These classes might offer instruction in Chemistry, Botany, and their applications to Agriculture and Industries, Drawing (Mechanical and its application to machine construction, etc.) and Freehand Drawing (with its application to such arts as carving, engraving, etc.).

(c) Offer result grants to successful students of these classes, either in addition to or in place of Government grants; and assist the most promising pupils to continue their studies to higher standards.

(d) Provide on loan, hire, or easy terms of purchase, the plant and apparatus requisite for teaching the subjects professed, collections of specimens, models, etc. The initial cost of providing these often forms an insuperable obstacle, which the Institute might do much to remove, in the way of starting technical classes.

(e) Arrange for combined classes. In a town where there are several schools, pupils may be drawn from all, but mutual rivalry will often prevent this being successful, if attempted by the managers of any one particular school. This feeling would be non-existent or small, were the arrangements supervised by an independent and impartial body like the Institute. The combined class could meet in one of the schools or in some specially engaged central room.

(f) Conversely, in towns where a sufficiently large class could be recruited from each of several schools, a special teacher could be engaged by the Institute who would journey from school to school. This plan is adopted for science teaching by several English School Boards, the teacher being provided with a portable collection of apparatus, arranged in a suitable wheeled vehicle and accompanying him from school to school. This will produce the largest effective result with the least unproductive expenditure. The Grant-in-Aid Code says (Sec. 9, Chap. V) "A teacher giving instruction in science, art, or industry in several small towns or in several schools in a large town, may receive special grants-in-aid for his travelling expenses. These special grants are only to be made provided that there is local organisation for a general system of science, art, or industrial instruction, that the teacher is highly qualified, and that local teachers possessing the requisite qualifications are not available." By the system proposed, the Institute will take the place of the local organisation contemplated, until the local public learn to appreciate the work of the Institute and form the necessary organisation to relieve it.

(g) The classes contemplated in this paragraph would, wherever and whenever practicable, include instruction in some handicraft. The importance of this, which forms the basis of the Slöjd and other systems, lies *not* in training the pupil to any particular trade, but in teaching him to use his hands, to make him handy, in short, when he comes to devote himself to any particular craft. The object of teaching boys, say carpentering in General Schools is not to make them carpenters, but is the same as the object of teaching literary students logic. The latter is intended to train them to reason accurately, the former is intended to train them to manipulate deftly.

14. It will be proper at this stage to repeat specifically the statement that the Council of the Institute should not contemplate continuing permanently as an organisation for the whole Presidency. It should endeavour to establish local organisations in the chief towns and industrial centres, which, while remaining affiliated to the central body, should gradually relieve it of the detailed

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(b) the introduction of science as part of the curriculum in middle schools and of children's occupations developing manual dexterity, and of object lessons developing habits of accurate observation and description as part of the education given in primary schools.

The science subjects for instruction in which science schools or classes will receive aid are stated in paragraph 12 of the above notification:

(ii) In regard to art—

(a) the establishment (ordinarily in connection with existing high schools and colleges) of industrial art classes; and

(b) the introduction of drawing and modelling into the curriculum of middle schools, and of drawing into that of primary schools:

(c) the establishment of schools of industrial art in large centres where a sufficient number and variety of students can be found.

The art subjects for instruction in which aid will be given are detailed in paragraph 12 of the notification above referred to.

(iii) In regard to industries—

(a) the establishment of industrial schools in which, as far as practicable, science and art are applied to the improvement of the industries, and in which correct principles are taught as well as improved practice;

(b) the establishment of industrial classes in connection with existing high schools and colleges, especially in connection with those having science and art classes.

The industries for instruction in which aid will be given are enumerated in paragraph 12 of the notification above referred to and in the Middle School notification.

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work of administration. Even a technical school or college proper, if started in the Presidency town, could only serve as a pioneer and model for local schools or colleges, and should look forward to eventually occupying the same relation to such Institutions as the University does to its affiliated colleges. The aim and work of the Institute should be, not to retain everything in its own hands, but to transfer the work to branches as soon as these can be constituted with sufficient guarantees of permanence. And as the promotion of Technical Instruction seems to be very specially within the province of Municipalities, and Local Fund Boards, these should be led to expect and find from the Victoria Technical Institute every assistance in the shape of advice, loan of teachers, etc. In this connection, it is important to remember that most industries are confined to special districts and not diffused throughout the Presidency. Instruction in industries should therefore be imparted in local centres and not preferentially in Madras itself.

15. Reference has already been made incidentally to the question of technical training for artisans and it has been pointed out how little good is likely to accrue from such attempts. There is, however, one aspect of artisan education which deserves earnest attention, though it may be a question as to how far it comes within the province of the Technical Institute. I refer to the education of the children of artisan castes, as for instance, weavers, * goldsmiths, etc. Any effort to impart technical instruction to such children has failed because they are totally devoid of general education and because their parents are unwilling to lose the value of their labour during the time spent in acquiring what appears to be useless knowledge. For the latter reason any endeavour to enforce a high standard would prove fruitless in the future as it has done in the past. The three R's, in the vernacular, together with drawing or some other technical branch, is all that can for the present be attempted. It was largely in view of these classes, that the Madras Educational Conference (1886) reported strongly in favour of raising the standard of vernacular primary schools and also of adding a vernacular side to Middle and High Schools (English being an optional subject). Both the Director of Public Instruction and Government reserved these points for further consideration, but so far as I am aware, nothing further has been done in the matter. Yet it cannot be doubted that the establishment of special schools for such special classes, with a curriculum carefully graduated to their capacities and needs, would do much to raise the general status of manufacturing artisans and so pave the way for more advanced and special Technical Instruction.

16. It now only remains to indicate the attitude of the Institute towards *special* Technical Education. I have already incidentally pointed out three obstacles to immediate or extensive action in this direction, to wit, want of money, want of teachers, want of teachable material. But in respect to all industries, except only agriculture and perhaps mechanical engineering, there is a fourth want which it ought to be an early duty of the Institute to remove either by its own exertions or by moving Government to action, in anticipation of the time when the other three wants shall have ceased to exist. I refer to want of knowledge, knowledge as to the extent and condition of various industries, as to how they can be improved by the application of scientific principles and methods, and as to what sort and amount of instruction is best calculated to lead to much improvement. In my previous minute on this subject I remarked that I had, in common with many other persons, a floating general idea that much could be done but that what enquiry I had been able to make into specific industries showed only the scantiness of our knowledge and the impossibility of framing on that scanty knowledge any practical scheme. I believed that the money, whether of the Institute or of Government, could not be better expended than in paying the expenses of a preliminary enquiry into the actual condition of native industries, *in esse* and *in posse*, not from the æsthetic but from the practical and economic point of view. The aim should be not to produce a renaissance or a resolution in India Art, but to discover whether, by improved methods of working and increased technical skill, competition is possible between native manufactures and foreign imports. After renewed attempts to study the subject, I still remain of this opinion; and I find that it is widely entertained and has been pressed upon the attention of the Indian Government. If the Government cannot see its way to appoint a special commission for this purpose, it would probably be willing to render assistance were the enquiry undertaken by the Council of the Institute. As the investigation proceeds, the ground will gradually be cleared for future operations, and work can be commenced by degrees as suitable opportunity offers. Whenever it has become clearly established to what extent and by what means an industry can be improved by Technical Instruction, the attempt should be made, on however small a scale, to improve it.†

17. These initial difficulties being removed and the Institute being supposed ready to begin the work of special Technical Instruction, it remains to indicate how the Council should proceed; and in this connection to discuss its relations to the Technical Institutions already in existence, namely, the Agricultural College, the College of Engineering, and the School of Arts. Generally, the procedure should be on the lines already laid down for a course of general Technical Instruction, with such modifications as may be rendered necessary by the localisation of specific industries. The Council would first endeavour to procure suitable instructors. These may in the first instance be specially trained here, or may be sent to other countries to be trained, or may be brought from other countries. The instruction given by them should be imparted only to those who have received a fair general

* For example, the children of the cotton weavers of Conjeveram, or of the silk weavers of Kumbakonum are almost wholly uneducated.

† Some very sensible and practical suggestions on this subject will be found in a pamphlet addressed to His Excellency the Governor of Bombay by Mr. Dinshaw Ardeshir Talleyakhan of Baroda. I here quote his list of artisans, which it will be interesting to compare with the enumeration by Sir T. Madhava Rao in a previous note.

(1) "Carpenters, (2) Blacksmiths, (3) Bricklayers, (4) Stone masons, (5) Brick, tile and mortar makers, (6) Shoe-makers, (7) Workers on hand-looms, (8) Dyers, (9) Potters, (10) Goldsmiths, (11) Copper smiths, (12) Jewellers (13) Matters, (14) Engravers, (15) Painters, (16) Sculptors, (17) Glass and lamp makers, (18) Paper makers, (19) Lacers, (20) Embroiderers, (21) Tailors, (22) Toy makers, (23) Banglers, (24) Carriage and furniture makers, (25) Gold and Silver leaf makers, (26) Bone and ivory workers, (27) Gold and Silver sorters, (28) Cane workers, (29) Carpet makers, (30) Gun smiths, (31) Sword makers, (32) Watch makers, (33) Compositors, (34) Printers, (35) Lithographers, (36) Photographers, (37) Mechanics, (38) Engine Drivers, (39) Drivers, (40) Boat men, (41) Ship men, (42) Clerks, (43) Accountants, (44) Bankers, (45) Soap makers, (46) Cloth printers, (47) Dye makers, (48) Gardeners, (49) Tanners, (50) Dairy men, (51) Musicians, (52) Mint men, (53) Spinners, (54) Weavers, (55) Fire men, (56) Sanitary road Inspectors, (57) Roofers, (58) Oil men, (59) Metal polishers, (60) Bead and hooka makers, (61) Comb makers, (62) Musical Instrument makers, (63) Snuff makers, (64) Attar makers, (65) Twiners, (66) Agricultural implement makers, (67) Saddle and harness makers, (68) Electro platers, (69) Rope and basket makers, (70) Cash makers"

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education and such technical education as may form the necessary basis for advanced training in the special industry selected. These pupils, when trained, should be encouraged to settle as teachers (especially in the artisan schools, paragraph 15), foremen or even independent manufacturers in the local centres of the industry in question; they should be superintended and when possible assisted by the Institute until a local organisation is formed to relieve the parent institution of its charge. It will be well to bear in mind that with limited means and opportunities, it is better to thoroughly take in hand one industry than to attempt a little with many.* It is at this stage that Exhibitions such as are recommended in Resolution II,*a*, may be usefully instituted. Every such Exhibition should have a clearly defined object, namely, to test the results of instruction in special industries, as evidenced by the work of the pupils themselves and of other workmen who may have been affected by their influence. For want of such a definite aim, most Industrial Exhibitions are but melancholy monuments of misdirected zeal and perverted ingenuity.

18. The Agricultural College provides everything necessary for the training of experts and specialist teachers. It would be work of the Institute to bring these specialists into contact with the general body of schools. In fact, Agriculture is the only branch in which we are in a position at once to attack the masses. It is the most widely diffused, it is perhaps the easiest to experiment with, and that it is also the most important, is matter for congratulation. Such large numbers of the population are interested, directly or indirectly, in agriculture, that we may hope ere long to see an agricultural class in every town boasting a Middle School.

19. The College of Engineering is intended, under its new constitution, to provide everything necessary for the training of Builders, Surveyors, and Mechanical Engineers. † From pupils who have been taught at School Geometrical Drawing and Mensuration, classes may be formed for instruction in building, road and bridge making, etc. These will be beneficial not only to professed builders, surveyors, etc., but to all taking an interest or share in local administration or in the management of their own property. Advanced instruction in Mechanical Engineering can be given with advantage only in large workshops. The committee visited the Gun Carriage Factory and the works at Peramboor (Madras Railway), in connection with both of which schools exist; and the Institute could operate usefully by apprenticing promising youths to these works or making other arrangements whereby its pupils should receive practical instruction.

20. The School of Arts occupies a somewhat different and a peculiarly indefinite position. This is not the fault of the officials of the school or of its pupils, but is inherent in its constitution. It was probably intended to be the South Kensington of Southern India; but what does South Kensington presuppose? It assumes that drawing is taught universally in secondary and even Primary schools throughout the country, and consequently that there is abundant material from which pupils can be drawn. It assumes a constant demand of qualified teachers and a large preferential demand for trained designers of pottery, carpets, prints, wall-papers, etc., in the great workshops throughout the country. It assumes a public taste educated so far as to demand at least variety, if not beauty, in its surroundings. In India at present these are wanting. The School of Arts has consequently had to diverge from its original intention. Its chief work now consist in teaching elementary drawing to school children, which ought not to be done in a School of Art at all but in the children's own schools. It also produces some very admirable works of art in wood, metal, and pottery, at high prices for connoisseurs, and which are executed to some extent by a few advanced pupils of the school and to a greater extent by ordinary paid and uneducated artisans. I think it may be said that the influence of the School of Arts as an educative agent cannot be traced in any other scholastic institution or in any industry or workshop outside the building itself. If the institute be successful in making drawing a general branch of study, there would be plenty work for half-a-dozen training schools for Art teachers; and, if nothing more were contemplated by the Institute, no change would—as far as it is concerned—be necessary in the constitution of the School of Arts. But in view of the further object of the Institute, namely, the application of Art to Industries, it would be a serious waste to allow the valuable appliances, staff, and experience of the School of Arts to be devoted to the subsidiary purpose of training teachers of elementary drawing. The latter work is certainly important but can be carried out by less expensive and ambitious institutions than the present School of Arts. Holding these views, I have the temerity to suggest that the School of Arts, the Technical Institute, and the cause of Technical Education would all be best served by transferring the management of the School of Arts to the Council of the Institute. I understand that it was originally intended that the School should be managed by an independent Committee and that the experiment was made without success; but I think the causes of failure, principally indifference, would not be found to exist in the Council of the Victoria Technical Institute. The transfer, to be made of course under proper conditions and saving all the rights of Government, would at once provide the institute with a local habitation, forming the centre whence its future operations would develop. Indeed, the advantages accruing to the Institute would be so great that I need not enlarge upon them and I am unable to perceive any disadvantages accruing to the School of Arts itself, to education, general or technical, or to Government. The proposal will doubtless in some quarters be considered revolutionary, but I much fear that unless something revolutionary be done, little good will be effected. It is obvious how all the proposals already made would harmonise with this transfer and be carried out with much greater ease and efficiency.

21. I shall conclude with a brief formal recapitulation of the scheme suggested. It is not proposed as exhaustive but as coherent yet elastic and admitting easily of modification or extension.

THE VICTORIA TECHNICAL INSTITUTE.

(Incorporated under the Act )

*Members.* (1) *Annual*, Subscribers of Rs. 50 yearly.

* It is perhaps unnecessary to mention that I do not consider as coming under the scope of the institute attempts to introduce new industries which require for success not skilled labour, but the more judicious expenditure of capital as for instance lucifer match making, twine and sack making, etc.

† I omit Civil Engineering proper as being a profession.

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(2) *Life*, Donors of Rs. 500 in one sum or in instalments extending over not more than five years.

*Executive Council*. (1) Twelve chosen for three years (four annually) from and by the members.

(2) Nine nominated by Government.

*Capital and Building Fund*.

| | Rs. |
|---|---|
| (1) Subscriptions received or promised | 80,000 |
| (2) Government grant | 40,000 |
| Total | 1,20,000 |
| of which to be invested | 75,000 |
| to be spent on building and library | 45,000 |

If the School of Arts be assigned to the Institute, then the last sum to be devoted to the Library and Museum, and to necessary alterations and additions.

*Annual Income*. Minimum of Rs. 3,000 from investments, new annual subscriptions, and unappropriated donations under Rs. 500.

*Special work in the Institute Building*—

(1) Library and Reading Room.

(2) Museum, with artisans at work.

(3) Popular lectures.

(4) Evening classes, for Drawing, etc., and in affiliation with other Institutions, for Agriculture, Mechanical Engineering, Mensuration, etc.

*Work in Encouragement of General Technical Education*—

(1) Offering scholarships to teachers qualifying in Drawing, Agriculture, etc.

(2) Offering results grants to teachers passing pupils in these subjects.

(3) Assisting managers and teachers in procuring the needful apparatus for instruction in these subjects.

(4) Arranging for combined classes.

(5) Supplying itinerant teachers.

(6) Assisting, or creating and carrying on, Schools for the Children of artisan communities

*Work in Encouragement of special Technical Instruction*—

(1) Enquiring into the condition of various industries, so as to discover which are capable of improvement by Technical Instruction and how the latter can be most suitably provided in each case.

(2) Procuring trained experts to afford this instruction in the first instance.

(3) Encouraging and assisting locally instructed pupils to teach others and to open or superintend workshops where the improved methods would be practised; and encouraging employers to engage such skilled men.

(4) Holding exhibitions of the work done by pupils of Technical Schools and by apprentices in regular workshops and granting certificates and prizes to successful exhibitors.

(5) Assisting in the establishment of new industries wherein technical skill is required.

PACHAIYAPPA'S COLLEGE;
*Madras, 18th July 1888.*

JOHN ADAM.

*Note*.—This Memorandum has been drawn up at the request of the Chairman of the Committee, the Honourable P. P. Hutchins, C.S.I. While it is passing through the press, the Government of India has issued a Resolution on the progress of education in India, in which the subject of Technical Education is dealt with. If the summaries that have appeared in the public journals be correct this Memorandum would appear to resolve itself into suggestions for the special application to this Presidency of the general principles enunciated by the Governor General in Council. I hope that, in the interests of Technical Education, such is the case.

JOHN ADAM.

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## *No. 7(d).—The Madras University on Technical education.*

READ—also the following papers :—

From W. H. WILSON, Esq., Registrar of the University of Madras, to the Chief Secretary to Government, No. 174, dated Madras, 9th October 1888.

In continuation of my letters, No. 657, dated 13th March 1888, and No. 91, dated 27th July 1888, I am directed by the Syndicate to inform you that the "Note on Technical Education in India" has been circulated to all Fellows of the University resident in Madras and the neighbourhood, and meetings of the Faculties of Arts, Engineering, and Law have been held to consider the opinions expressed and the remarks passed on the subject in circulation, and to adopt resolutions with reference to the various questions raised in the Note so far as they affect each separate Faculty. The Faculty of Medicine has not yet been able to hold a meeting, owing to the absence from Madras of the President and the majority of the members.

2. The resolution passed by the Engineering Faculty is as follows :—

The Faculty consider it would be well to recognize the importance of practical training for candidates for the B. C. E. degree, and recommend the Senate to demand from all candidates a certificate of having passed through a practical course, such as that prescribed for students at the Civil Engineering College; such certificate to be forwarded to the Registrar before the candidate can receive his degree.

In the opinion of the Faculty, it is also desirable that the intermediate and elementary theoretical instruction given in the Civil Engineering College in Engineering and allied subjects should be supplemented by practical training, and the certificates should not be granted until the candidates who have passed in the theoretical subjects have satisfied the Board of Examiners as to their practical attainments..

3. The Faculty of Law remark that it would be desirable to provide greater facilities for the study of law in important towns in the mofussil, if it can be done consistently with the object which must be kept in view, *viz.*, that of the creation of a well-instructed and independent bar, competent to raise the tone and morale generally of the legal profession and of the native civil judiciary in this country. They are, however, of opinion that, under existing circumstances, it is not possible to open in the large central towns law classes in which an education commensurate with the above stated object could be afforded. In the first place, there are at present only two first-grade Government colleges in the mofussil—one at Kumbakonam and the other at Rajahmundry; whilst there are several other equally important towns, such as Mangalore, Calicut, Madura, Trichinopoly, Bellary, Vizagapatam, and others, which have also strong claims to the facilities which it is proposed to provide.

The members of the Faculty think that it is vain to expect that sufficiently strong law classes could be opened in all these towns, or that the requisite persons could be found capable of imparting legal instruction on a sound basis and according to improved methods of teaching. The difficulty would, in their opinion, not be materially lessened if the experiment were confined to the two towns where there are first-grade Government colleges. It is not to be supposed that students living at any distance from those towns, though in the same or neighbouring districts, would go to reside in them for the purpose of attending law lectures more readily than they would come to Madras. A considerable proportion of the candidates who appear for the first and second grade pleaders' examinations are persons who are not in a position to choose their own place of residence, or they are persons who have completed their general education so far as their means permit, and who, having already joined the public service or being otherwise employed, are unable to devote their whole time to the study of law in any school.

In view of these circumstances, and in view of the considerable cost at which only legal instruction of a high order could be carried on, it does not appear probable that students would attend at the Kumbakonam or Rajahmundry college in sufficient numbers to make the classes self-supporting. Whatever may be the demand for legal education in the mofussil, it is also important to note the fact that the number of candidates who pass the first and second grade Pleaders' tests every year is in excess of the requirements of the public service, and that graduates in law are spreading over the mofussil in increased numbers every year, and are, in the ordinary course of progress, pushing inferior practitioners into positions commensurate with their educational status and legal acquirements. This is a state of things which is favourable to the steady growth and development of a superior class of legal practitioners such as is indicated in paragraph 67 of the note referred to the Faculty for an expression of opinion, and it is one which they would be sorry to disturb by the opening of weak law classes in the two first-grade mofussil colleges.

The Faculty are the less willing to recommend any steps being taken at the present time in the direction of improving the means of legal education in the mofussil since they have learnt that it is in contemplation to establish a law college in the Presidency town and to institute a professional council as the governing body under the general control of Government in the Department of Public Instruction and thereby to raise and improve the status of legal education in this Presidency. If such college and council are established, provision might afterwards be made for instituting law classes in several important mofussil towns for Pleaders' Tests and Uncovenanted Civil Service examination, and for imparting elementary instruction in law by lectures, tuition, or both, as part of the general scheme and under the direction and control of the council of legal education. The Faculty consider that such mode of providing additional facilities is more likely to encourage the spread of sound elementary legal knowledge, and that the opening of weak law classes under an inferior staff of teachers in both or in either of the existing first-grade colleges is not desirable, or may at all events be postponed until the proposal to establish a law college in Madras, and to provide greater facilities for the study of law in the mofussil in connection therewith, shall have been finally considered by the Local Government and the Government of India.

4. The Faculty of Arts discussed *seriatim* those recommendations contained in paragraph 92 of the note with which they considered themselves competent to deal, and passed the following resolutions thereon :—

(7) If agriculture and veterinary science are recognized in the scheme of public service examinations for this Presidency, agricultural and veterinary classes will come into existence without any direct action on the part of the State, and there is no reason to establish schools, or special classes in the few Government institutions that remain.

(8) The solution of this question rests upon such action as may be taken by Government in regard to the tests for the public service.

(9 and 10) The very great importance is recognized of extending instruction in drawing throughout the country, but the time has not come to adopt the stringent measures suggested in the note.

No. 7(d). Madras University on Technical education, 1888.

(11 and 12) With regard to recommendation 11, elementary science is already included in the compulsory portion of the curriculum of high schools and is optional in secondary and primary schools, and the faculty are not prepared to support the adoption of the stringent measures proposed in recommendations 9 and 10.

(13, 14, and 15) The Government are taking adequate steps to remedy the defects noted in these clauses. With regard to the suggestion that examinations testing knowledge in technical subjects should be instituted by the University, it is observed that the Senate in 1879 decline to take up the Middle School examination on the ground that the Act empowered the University to hold examinations only with a view to conferring degrees, but the Faculty express no opinion whether the view of the Senate should be adhered to or not. They leave the question to the Senate.

(16) This recommendation does not commend itself to the Faculty.

(17) This recommendation should be left for the consideration of the Senate in connection with the High School scheme now before it.

## *No. 7(e).—Note on Medical education in Madras.*

No. 7(e). Medical education in Madras.

READ again—G. O., dated 18th September 1886, No. 604, Educational.

READ—also the following papers :—

From Surgeon-General with the Government of Madras, to the Chief Secretary to Government No. 315, dated Fort St. George, 21st October 1886.

With reference to G. O., No. 604, of 18th September 1886, I have the honour to submit the following remarks for the information of the Right Honourable the Governor in Council.

2. In the note received from the Government of India there are two recommendations regarding medical education. The first is that inquiries be made whether it is not desirable that greater facilities for the study of medicine be provided in mofussil colleges in Madras, and the other, that instruction in all medical schools be made more practical than at present.

3. As regards the first suggestion, there are now three medical schools in the mofussil in Madras, *viz.*, at Nellore, Tanjore, and Madura, and at present there does not appear to be any necessity for increasing this number, as these institutions, together with the Auxiliary Medical School at Rayapuram, can turn out as many hospital assistants as can be provided for according to the present rate of demand. It has further to be remarked that the tuition and clinical training in mofussil stations can rarely equal the educational advantages which can be provided at the presidency town, as the teachers up-country are fewer and not usually of such a high class, while the hospitals are small and the facilities for clinical training comparatively inferior. In short mofussil medical education is necessarily of a lower order than that available at the presidency and the propriety of greatly extending it is accordingly questionable. In no case are pupils educated in mofussil schools beyond the requirements for the grade of hospital assistant, and all subordinates above that rank are now recruited in this presidency from young men who have got a medical education at the Presidency Medical College at their own expense.

4. With reference to the suggestion that the instruction in all medical schools be made more practical, I think the minute under reference confounds two distinct matters, inasmuch as practical medical knowledge is not acquired in the class-rooms but in the wards of the clinical hospitals, of which there are several in Madras, and in which the training is as practical as it could possibly be. At the same time I agree with Dr. Keess in the remarks contained in his letter embodied in the order of Government under reply, that it would be desirable to illustrate the lectures on Physiology, Pathology and Hygiene by practical demonstrations to a larger extent than is done at present. I also fully recognize the paramount importance of Practical Hygiene, but I do not consider that it will be necessary, as he recommends, to get a specialist from England to teach the subject. The men who teach Hygiene at Netley are officers of the sister service, and there seems no reason why suitable teachers should not be found in the Madras Medical Department. In fact, I am prepared to nominate a fully-qualified man for conducting a practical course when necessary. Dr. Keess' recommendation, that a properly-equipped laboratory for teaching Hygiene be provided as soon as possible, has my approval.

## *No. 8.—Education of Europeans and Eurasians.*

Dated Madras, 11th August 1884.

From—W. A. SYMONDS, Esq., [late] Honorary Secretary, Friend-in-Need Society,

To—The Chief Secretary to the Government of Madras.

No. 8. Europeans and Eurasians, MADRAS, 1884.

I hope and believe I shall not be considered officious in venturing to call the attention of Government to the increasing degradation and pauperism of poor country-born Europeans and Eurasians.

2. I have the honour to enclose four copies of a pamphlet," The Eurasian Problem," which contains the views of the Hon'ble Dr. Cornish, Mr. D. S. White and myself, and which discloses facts and considerations showing the necessity for State action on this question.

**No. 8. Europeans and Eurasians, MADRAS, 1884.**

3. The views I expressed in this pamphlet as to the cause of the evils in question have recently been confirmed by Archdeacon Baly of Calcutta in a paper read at a meeting of the East Indian Association in London.

4. Opinions may differ as to what should be the remedy for this deplorable state of affairs, but there can be no question that, unless Government take up the matter, the condition of the classes referred to, at present discreditable, will ere long become not merely dangerous, but to the last degree disgraceful to the Government and to Europeans in this country. Lord Canning thought that, if the descendants of the Europeans of the middle and lower classes were not educated, they would in time exhibit the worst qualities of Europeans and of natives, and become unmanageable as well as profitless. Enquiry at the present moment would probably reveal the fact that half these people have no careers open to them except to become vagrants, beggars or dependants on charity. It is said by some that there is ample employment to be had in the country by all willing to work, but I have tested this. I have had applications from many able-bodied men undoubtedly willing to work, but I have not been able to obtain employment for them except as porters and coolies. The invariable reply to applications to Railway managers, Engineers, etc., is that there is plenty of employment, but only for men who have received technical instruction in workshops. As pointed out in my paper on the Jail Manufactures question, the market for unskilled labour is glutted, but there is a great and increasing demand for skilled labour, which ought to be supplied in the country itself. Mechanics are imported from England at great cost, and this only aggravates the evil. They beget children who must, almost of necessity, become paupers, vagrants, or criminals.

5. The views I have expressed in my pamphlet as to State-aided migration have undergone modification at least so far as the rising generation is concerned. The policy of fostering indigenous arts and manufactures, together with the extension of railways, will provide suitable employment for great numbers of skilled mechanics. The obvious remedy then is to provide technical instruction for the children. As regards adults, an enquiry as to the results that have attended the experience of Eurasian colonisation in Mysore would be most opportune, since it appears that the Mysore Government contemplate the resumption of the lands not yet brought under cultivation. I have always contended that without State aid any migration or colonisation schemes must end in failure. The Mysore Government having granted the land, it is possible it might be found, on enquiry, that assistance from the British Government would enable a number of persons now destitute to maintain themselves.

6. But, apart from all other considerations, the fact of the Eurasian population having decreased $17\frac{1}{4}$ per cent. during the decade 1871—1881 is of itself, I respectfully submit, sufficient to establish a case for enquiry. I therefore most respectfully suggest that Government should appoint a committee to enquire into and report upon the state of the poor country-born Europeans and Eurasians of the Presidency. Other questions which it might also be desirable for such committee to investigate are mentioned at page 29 of the enclosed pamphlet.

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## *No. 9.—Scheme for the development of Scientific and Technical Education in Madras.*

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No. 2101, dated 31st March 1885.

From—H. B. Grigg, Esq., M.A., Director of Public Instruction,

To—The Chief Secretary to Government.

In reference to G. O., dated 4th October 1884, Mis. No. 620, Educational, I have the honour to forward for approval the enclosed draft notification regarding the higher examinations in science, art, and industries in connection with the scheme for the development of scientific and technical instruction in this presidency that I have sketched in my letter to you of the 3rd September 1884, No. 6397.

**No. 9. Madras Technical Scheme.**

*Rise of Technical Industries in England.*—It may not be out of place here to notice briefly the rise and progress of technical instruction at home, extending over a half century. It began with the Select Committee of the House of Commons appointed in 1835 to enquire into the best means of extending among the people; especially the manufacturing population of the country, a knowledge of the arts and of the principles of design. The immediate effect was that a "Government School of Design" was established in London, a step followed somewhat later by a system of grants-in-aid to "Schools of Design" set on foot in the manufacturing districts. This system was, however, not found to work satisfactorily, and after the Great Exhibition of 1851 had largely drawn attention to the deficiencies, as regards art, of the English workman and, as regards science, of the English manufacturer, the Department of Science and Art was created in 1853, and in 1856 was placed under the Education Department. The scheme of 1853 was, it was stated, "Intended to provide for the creation, in the metropolis of a high-class science school capable of affording the best instruction on the most perfect training, as well as for the extension to local institution, for practical science, of a system of grants-in-aid, such institutions being made as largely as possible self-supporting." In the first direction what was done was to enlarge the

character of the Government School of Mines, so as to include several more important applications of science.* In the direction of aid to science instruction little was done until 1859. In that year an examination for science teachers was held, and aid was offered in the shape of certificates and other grants. Ultimately the system of aid adopted for the science schools and art schools was mainly that of payment on the results of examinations. Until, however, the stimulus of general examinations was applied, the efforts that were made for spreading science and art education by creating a supply of trained teachers admirable though they were in intention, proved almost a failure and had to be abandoned. The reason stated by the department is worthy of remark. It is as follows:—

> "The then Lord President, the late Lord Salisbury, and the Vice-President, Mr. Adderly, now Lord Norton, were very anxious to press forward the training of teachers, but it was soon evident that science instruction could not be advantageously aided at that time in the provinces in this manner. There was no career for science teachers when trained. The demand for them did not exist and had to be created. That is to say, there was no opening for a man to earn his living by science teaching alone. It was only local men, with other occupations, who were in a position to undertake science teaching. And the stimulus afforded by payments on results and other aid offered by the Department was so effectual that, while in 1860 there were only 9 science schools and 500 students under instruction, there were at the commencement of 1880 about 1,45 schools with nearly 45,751 classes in different subjects and 57,000 students under instruction. The conditions have thus completely changed, and employment can now be obtained by well-instructed teachers."

Similarly on the art side, the number of pupils under instruction rose from 6,997 taught in the old "schools of design" to 72,054 in 1883.

A further stimulus was given to the education in science of the industrial classes by the foundation in 1868 of the Whitworth scholarships (thirty in number, of the annual value of £3,000), which are given on the results of examination in certain branches of science to those who have been practically engaged in mechanical engineering for at least three years.

But perhaps the most successful effort yet made for widely spreading technical education in regard to the manufacturing industries is that of the City and Guild of London Institute in its system of technological examinations, "a system which has already taken root in all the large manufacturing centres of the country, and has in many cases led to the establishment of well-organized and properly-equipped technical schools and classes. In connection with these examinations a large number of evening classes have been instituted, in which practical instruction is given in the application of science and of art to different industries. The work done by the students in these classes is inspected and examined by the institute, and, on the results of the annual examinations, certificates and prizes are granted, which are beginning to be regarded as diplomas of proficiency, and which frequently enable the operatives to obtain better employment and higher remuneration. These evening classes have already become, and are likely in future to become still more, the nuclei of technical colleges mainly supported by the towns in which they are situated, but connected with and affiliated to the City and Guild of London Institute by means of its superintending influence. In old times, at the close of his seven years' apprenticeship, and on his giving satisfactory evidence of his proficiency, the master and wardens of the guild admitted the young apprentice to the freedom of the craft, and the award of the full technological certificate of the institute, which is given to those only who satisfy the examiners of their theoretical and practical knowledge and, in such cases as admit of it, of their skill in workmanship, may be regarded as the modern equivalent of this ancient practice."

The institute has lately embarked on the enterprise of direct technical instruction, having opened in 1883 a technical college of its own in Finsbury, and in 1884 a large "central institution" in South Kensington.

*Inferences.*—Briefly, then, in England the system found to be most successful in extending and improving technical educations in science and art has virtually been to begin with a system of general examinations, thus creating a demand for trained teaching, and then to train teachers to meet that demand. This system leads to a continually-increasing number of new schools and to instruction continually improved as teachers are forthcoming abreast with the most recent progress made in science and arts as applied to the industries. Though in the matter of technical education England has been generally supposed to be considerably behind its continental neighbours, and though, to a certain extent, this is true as regards France, Germany, and Switzerland (and even of Italy too, which, while ranking after the first-named countries, possesses nevertheless a well-organized system of technical instruction), yet there is no doubt whatever that England, under the present system, is rapidly making up for lost time and is in some respects beginning to afford a model for continental countries. The Royal Commission in its last report expressly states that "for the technical education of workman outside of the workshop the resources of continental countries have hitherto been, are and still very much more limited than has hitherto been supposed to be the case," and that "no organization like that of the Science and Art department or of the City and Guild of London Institute exists in any continental country, and the absence of such organization has been lamented by many competent persons with whom the commission came in contact abroad."

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* The plan of instruction was as follows:—

"*A.*—General division, for those who desire a general knowledge of applied science.

*B.*—Mining and Metallurgical division, for students who intend to pursue mining or matallurgy.

*C.*—Technical Division, for those who propose to engage in other arts or manufactures depending either chiefly on chemical or chiefly on mechanical principles.

*D.*—Working men's division, for the instruction of working men by evening lectures.

One the student entering for divisions B and C, or the "matriculated" student, who desired to obtain the diploma of the school, a certain course of instruction, common to all, was compulsory in the first year, while in the second year the student might devote himself to the subjects of one of the divisions."

The lesson to be drawn from the above brief history and comparison would seem therefore to be that, in starting in this presidency an organisation for the development of a system of improved technical education, it will be well, profiting by the experience of our predecessors in a similar path at home and abroad, to try the stimulating effect of a scheme of examinations, supplemented by a system of liberal grants-in-aid, making at the same time provision for the supply, so urgently needed, of well-instructed and professionally-trained teachers. And, in addition to this, steps will need to be taken to develop the scientific and art institutions now existing at the presidency, so as to make them, not only teach all or most of the sciences and arts of which need is at present felt, but also serve both for the provision of a supply of science and art teachers, and as models for private effort.

*Public Examinations.*—Looking first at the effect of public examinations, it is matter of notoriety that in this country still more than at home, to institute public examinations in any suitable branches of knowledge is to create a demand for instruction in them. The University examinations have called forth, in numbers far beyond all anticipation at the time they were instituted, both candidates and teachers and the Middle school examination has been even more successful in that way. And in the matter of the number of candidates likely to come up and of the demand for teachers, it may be well to remind ourselves that, as the experience of the University has shown, Madras will be a centre, not only for this presidency, but for the outlying States of Hyderabad, Mysore, Travancore, and Cochin, and even for Ceylon, Burma, and the Straits Settlements, so that virtually it will provide for the development of technical instruction among some eighty millions of people. It may be objected that the cases are not parallel, since (it may be alleged) the demand for literary labour of a high order has been constant for years past, and consequently examinations testifying to the possession of such literary proficiency have always been held in high esteem. This is no doubt true in a measure, but experience shows that the young Indian is so far-seeing that he will readily during his youth add to his general acquirements by passing in branches of knowledge, that there is only a remote prospect of his being able to make subservient to his personal advancement or profit. Moveover, there is a growing feeling that the literary market is over-stocked, and consequently that if educated men, Hindus especially, are to obtain a provision for life, they must turn their attention to non-literary branches of knowledge. Not only so, but the large number of applications from castemen which the recent requisition for an interpreter for Natal called forth goes to show that educated men will soon begin to look, not only out of the presidency, but even out of India, for remunerative employment. But quite apart from these considerations, it must not be forgotten that the possession of certain knowledge (provided the knowledge is sound and practical) has a direct tendency to make the possessors seek the means of applying his knowledge to th conditions in which he is placed, and thus gradually there is created a demand for specialists. And, further, the existence of readily accessible schemes of instruction in branches of knowledge mapped out in suitable syllabuses or indicated by reference to particular text-books leads men engaged in scientific or industrial pursuits to seek to acquire additional knowledge in cognate subjects, and such additional knowledge the exigencies of their lives render valuable, although the men may never actually appear for a test examination in it. Thus the effects of public examination are far more wide-reaching than the number of candidates who pass examinations would indicate.

But, besides these general reasons, there is the more cogent and acknowledged necessity that for students of subjects not falling within the scope of the University, there should be provided public examinations conducted by examiners of unquestioned special knowledge in the branches concerned, but entirely independent of the institutions presenting the candidates. Even now the Agricultural College, the School of Arts, and two or three Industrial Schools require such a scheme of examinations if they are to work with full success and if they are to secure a full measure of public confidence and ensure the certificates they grant being duly appreciated. A few years ago the Medical School had no such examining body, but Surgeon-General Cornish, admitting the necessity, obtained sanction for such a Board, which has been working satisfactorily. The Civil Engineering College, although arrangements are made by the educational authorities for conducting the final examinations by gentlemen not connected with the institution, has not at present such a Board, but it is now contemplated to create a Board to examine in such subjects as will not fall more appropriately to the examining bodies it is proposed to create under this draft notification.

*Grants-in-Aid.*—In the enclosed draft chapter for the revised Grant-in-Aid Code ample provision has, I think, been made for special encouragement to art and science schools, whilst in the salary chapter provision has been made for liberal grants—25 per cent. above the standard rate—for science and art teachers in ordinary schools; in the result grant chapter for grants for pupils passing under the standards in science and art; and in the miscellaneous chapters for grants for ordinary industrial schools, for grants for machinery, plant, apparatus, and chemicals. If the proposals now submitted are accepted by Government, this draft chapter will be finally considered by the committee now sitting to revise the Grant-in-Aid Code, or by a special committee.

It is desirable that at first a considerable number of those who pass the examinations should find employment as teachers, and to encourage this certificate grants will be given to those who have a sufficient number of pupils *bonâ fide* under their instruction in special schools or classes, while result grants will be given on their pupils passing the tests fixed in this and in the Middle School Notification. And, in addition to the ordinary building and rent grants, grants will be given in aid of the building and fitting of laboratories and demonstration-workshops, and the purchase or rent of demonstration-farms. Grants will also be given in aid of museums, partly (it is proposed) in the way of building grants or rent grants, and of money grants for the purchase of models, etc.,—partly in kind from the spare collections of the Madras Museum.

Science, art, and industrial scholarships are also provided for both in the notification and in the special chapter of the code, and it is hoped that, by these, pupils who have shown a bent for science, art, or industries and a certain amount of capacity therein, but who are not able to join special institutions, may be enabled to prosecute their studies further at the science, art, or industrial classes in connection with ordinary colleges. In order to diffuse, as widely as possible, the special instruction contemplated, such classes will be permitted to be either day-classes, or evening-classes, and

to admit outsiders as well as the students pursuing their ordinary studies at the college to which the class is attached. The scholarships provided in this chapter will not be available for students at the Agricultural College, the School of Arts, or other special institutions which give stipends to their students; but students of these institutions earning the prize scholarships under the notification will be permitted to draw such scholarships in addition to the stipends they may be receiving in their own institutions. The science, art, and industrial classes and schools will offer a sound technical education to youths from secondary schools who are willing to enter industrial careers, and these classes may also in time be availed of by the more intelligent artizans who have received some education at ordinary schools. Such are at present few, but their number is increasing. Industrial schools are at present few in number, but the proposed scheme will, if adopted, give a stimulus to the establishment of such, and from them a considerable number of candidates may in time be expected to come up for industrial scholarships that will enable them to carry their technical studies further than otherwise would be the case. Even already the publication of the last Middle School Notification has had a stimulating effect in this direction, and in a few schools, hitherto entirely of the ordinary type, the constitution of industrial classes is contemplated, while previously existing industrial schools and classes are, I understand, being reorganized on a more systematic footing, so as to work on the lines laid down by Government.

*Government Schools and the Training of Teachers.*—To give a fair start, however, to technical education, it is essential that Government should take the lead in such education, as was originally done in England by the establishment of the Government School of Design and the Government School of Mines, and as is at present the case in the vastly-improved institutions that have sprung from these and that now exist at South Kensington as the Departmental Normal Schools of Art and of Science respectively. Even in England, the great Technological Training College of the city and Guild of London Institute did not spring into existence till Government had set the example; and in this country, where there are no corporations with vast funds at their disposal, where private enterprise seldom leads, and where the conditions are in so many respects different, it is still more essential that Government should show the way. Just as in the matter of ordinary education Government colleges and schools have been found necessary to create a demand for sound education and to serve as incentments and models for the establishment of private institutions and to create a supply of teachers, so it will have to be as regards scientific and technical instruction. One institution for science as applied to the industries connected with agriculture, another for industrial art, and a third for the profession of engineering and for the allied subjects, would suffice at first as far as Madras goes, and these can be developed out of the existing institutions—the Agricultural College, the Schools of Arts, and the Civil Engineering College; while in the mofussil all that will be needful is, as I shall subsequently propose, to add slightly to the staff of the ordinary colleges and high schools. There will also, I feel sure, be no great difficulty in these three institutions in temporarily providing to some extent for training teachers; the most promising pupils might, towards the end or after the close of their regular course, for a limited period, either associated in the regular teaching as demonstrators or temporary lecturers, or (as is now done in the Schools of Arts) be required to repeat lessons given by the class teacher or to teach classes in his presence. The transfer ultimately of the Madras Normal School to Saidapet will, however, afford the best facilities for training in the art of teaching, and special pecuniary inducements will be held out to students to qualify as trained science teachers. In the majority of the art and science subjects included in the notification, the three special institutions above referred to might immediately be made to provide the means of substantive instruction, not only for the town of Madras, but also for up-country students able to come to Madras. Arrangements can gradually be made for other of the subjects being added. Thus the school of Arts could teach drawing, painting, modelling, engraving, practical design for window, mural and other decoration, decorative metal work, and shortly (by the addition of wood-carving) furniture and agricultural wood-work,; also hereafter pottery, glass-manufacture, carpet-weaving, and cabinet-making. I have now before me proposals of Mr. Havell's to include most of these subjects. The Engineering College could teach the various branches of engineering and the subsidiary subjects as at present, and also perhaps machine construction and drawing (with steam and heat) and electrical engineering as well. The Agricultural College would teach agriculture and the allied branches, including agricultural chemistry (inorganic and organic), geology, physiography, forestry, and veterinary surgery and medicine, and also, in an elementary form, surveying, levelling, and plan drawing. For instruction in biology and the higher chemistry, the Presidency College and the Christian College afford advantages; while for practical training in some of the industries the Madras Municipality might be induced to offer facilities at its workshop, and possibly the Madras Railway at its workshop. It will be the more necessary, to strengthen the Madras institutions which give instruction in science, art, or industries, because, for some time to come, it will be principally to them that the mofussil and the outlaying States will look for a supply of competent teachers. Probably, as in England, local schoolmasters who have a taste for science, or art especially those who have graduated in physical or natural science, will, if attracted by sufficiently liberal offers, be willing to come to the capital to receive instruction and training. Others again, not schoolmasters, who have availed themselves of their advantages to qualify as teachers of science or art, will seek employment in that capacity, and in this way the means of instruction will in time be made available in all centres of any importance.

*Outline of Notification.*—Before proceeding further, I will give in brief outline the draft notification enclosed. It begins by quoting the instructions of the Government of India on the subject of technical education and by defining the object of Government in instituting the examinations and their general character. It then gives in detail the classes of persons it is proposed to examine; care having been taken to include only such as desire knowledge of a kind likely to find a demand in the country: the examinations are to be conducted by Boards of Professional Examiners to be appointed by the Commissioner for the Uncovenanted Civil Service Examinations or, should the Government require it, by Government. The Examinations are to be held in Madras and also in other central places if necessary. These examinations are to be of two standards—the preliminary higher and advanced higher. For admission to the preliminary examination the candidates must have passed the Middle School test or some higher examination, but, although no absolute general education test is fixed, the standards of the preliminary and advanced examinations

contemplate the student having a general education equivalent to the Matriculation or F. A. examination respectively. The preliminary higher examinations are intended to supplement in certain subjects the Middle School examination, whilst the advanced higher examinations complete the preliminary ones, although in some cases the test at present stops at the preliminary stage. The scheme contemplates candidates coming up either in single subjects or in a group of subjects. The group examinations are especially intended to meet the case of colleges and schools training students for a particular profession, and for others, who, though not entering such institutions, complete gradually a group of examination that will place them on an equal footing with students so trained. The list includes only those subjects, as already stated, in which there is now, or is likely soon to be, a demand for certified knowledge. The diplomas to be granted to the students of the Agricultural College and School of Arts are specified, but not those which may be obtained in any department of the Civil Engineering College, as I am not at present aware whether the scheme will be acceptable to the Department of Public Works; if it is so, as I hope will be the case, the draft can be modified to meet the change. The notification concludes, after providing for certain prizes and exhibitions, with the conditions necessary for the grant of teacher's certificates in science, art, or industries.

The draft programme embodied in the notification will, I trust, be held by Government generally to meet the facts of the existing position as regards the demand for knowledge of science, art, and industries, and to provide sufficiently at present for its development. Although that demand is not at present great, there is already a vague desire arising for such knowledge; the scheme proposed will stimulate that desire. Examinations once notified, prizes, rewards, certificates, and diplomas once offered, there will, I think, be a supply of those wishing to be candidates and science, art, and industrial teaching will begin to be in demand. The introduction of drawing as a subject of instruction in primary and middle schools will probably lead to art classes being before long established in connection with high schools and colleges, and the art scholarships will encourage the formation of such. Though such science or art classes may not afford instruction in the complete curriculum of the sciences or arts necessary for a diploma or even for a group certificate in any branch, they will in more than one way serve as nurseries for those institutions that cover the whole ground. As already stated, the only institutions at present coming wholly within the provisions of the notification are the Agricultural College and the School of Arts; to the students of the former the notification offers certificates and deplomas for the lower and higher groups of study in agriculture, forestry, and veterinary surgery and medicine respectively, and to those of the latter for art and art industries. And as other studies have been similarly grouped together so as to meet (as far as at present practicable) the case of students in branches other than those taught at the above institutions, such students also, if they avail themselves of the means of instruction offered by the classes attached to ordinary colleges and pass successively in one or more subjects, will, when they have passed in all the subjects, of a group, be able to obtain certificates or diplomas according as they pass in the lower or higher group.

In all the examinations that will admit of it there will be a practical side and upon this feature great stress is laid in the syllabuses and in the system of marks. Half the maximum marks will be assigned to this practical side, and out of that every candidate will have, in order to pass, to obtain at least one-third. This is necessary, because what it is desired to promote is not knowledge acting on material progress merely indirectly, but knowledge which directly bears upon industrial development. To quote from a recent speech of His Royal Highness the Prince of Wales, "Hitherto all schools have led up to the universities and literary training has been encouraged to the disadvantage of scientific instruction. Manufacturing industry has consequently not been able to attract to its pursuits its fair proportion of the best talent of the country." Not only is this still more decidedly the case in this country, but even such science teaching as has been encouraged has been mostly theoretical, and certainly has had no direct reference to industrial pursuits. A science B. A. of the Madras University does not learn enough practical science to earn his living in any industrial pursuit in which the practical application of some branch of science is requisite. It is hoped that this will not be the case with those who obtain the diplomas or group certificates of the proposed examinations, but that they will either as practical agriculturalists, or veterinarians, or builders, or machinists, or telegraphists, or electro-metallurgists, or designers or cabinet-makers, or printers, or in some other industrial pursuits, be competent to earn a livelihood independently of Government service; while on the other hand, the examinations may, should the Government at any future time desire it, serve as a test for admission to those departments of the Government service which require a knowlege of any particular branch of science, art, or industry, or of a group of such. That those competent to do good practical work will find employment there can be little doubt. Even the students of the Agricultural College and of the School of Arts, in spite of the poor general attainments of the majority of them, have hitherto done so; and with an improved and more practical curriculum and a searching experimental and literary examination, they are still more likely to do so. In the syllabus of agriculture it is provided that the full diploma shall not be granted until the student has in all (including his college course) devoted five years to his profession. Similar conditions are attached to one or two other branches. Good veterinarians will find their services in good demand, and so will good builders. Even for foresters there is a demand outside the service of this Government or of the Government of India, as native states and large zemindars are becoming alive as to the necessity of employing them. Trained machinists have hitherto had to be brought out from England; a local supply would meet a demand slowly but surely tending to increase. In all manufacturing industries in this presidency and in the native states and the British colonies that are educationally its dependencies, there is a want of foremen and managers possessing higher technical knowledge; this is because the cost of imported skilled labour is often too high to allow of its employment except by large capitalists, and it is often for want of such that establishments do indifferently both industrially and financially. The workmen are generally so ignorant as to be unfit to rise to the higher positions, while outsiders possessing the superior intelligence that is requisite in a forman or manager lack the practical skill. Men possessed of both qualifications are wanted and would, as the value of the certified employe's labour becomes known, find many establishments willing to engage them.

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It is partly on this account that certain industries, such as pottery, glass-making, and carpet-weaving and paper-making have been introduced into the test, because it is hoped that in the Madras School of Arts arrangements may be made for their study by a superior class of men, and that, as the fact becomes apparent that improved productions will sell at higher prices, private capital may be invested in large establishments, for which a superior class of workmen, foremen and managers will be necessary. At present pottery, for instance, is almost entirely in the hands of individual workmen whose want of means prevents their investing in the plant that is essential to improved working.

*Agencies.*—The principal agencies that it is contemplated to employ have already been detailed in paragraph 5 of my letter to you, dated 30th September last, No. 6397. In each Government college, when pupils can be got in sufficient numbers to form a class, science teachers and drawing masters will, as soon as practicable, be appointed,* and some of the existing ordinary teachers will, should the Government approve the proposal, be offered inducements to qualify in special branches, receiving grants as an addition to the salary for extra work done by them as science or art teachers. In most large towns there are a number of young men of some of education, who will, I hope, be ready to join such special classes if the fees at first are fixed at a very low rate, and this is the very class which it is so essential to direct to industrial occupations. It has been suggested by the Principal of the Rajahmundry Government College that a carpentry class might be worked in connection with the colleges. The experiment might be tried in the Rajahmundry College if a qualified instructor can be procured. In Government colleges the teachers of science, art, or industry should be paid partly by fixed salaries (or, in the case of teachers employed in ordinary teaching also, by fixed additions to their other salary) and partly by payments on the results of the annual examinations. In aided colleges it is proposed that aid be given partly on the results as above and partly by half salary grants to certificated teachers. In the beginning the certificate need not too rigidly be insisted on, provided the department deems the qualifications sufficient for the special work to be done and the teacher agrees to study for the method and teaching power certificate. When a museum or art collection is opened and approved of by the department, the teacher should be the curator, receiving a small extra stipend or grant, the hope of which will encourage him to push on that part of the scheme.

*Examiners.*—It will be necessary for Government to sanction suitable scales of remuneration for examiners, so that the services of gentlemen of high standing and competent knowledge may be secured, thus from the beginning stamping a high character on the examinations. At the outset the examinations will not be likely to pay their own expenses, but they will in time, just as in the case of the University and Middle School examinations. Their stipends, however, will be met from the General Fee Fund at the disposal of the Commissioner of the Uncovenanted Civil Service Examinations and need entail no direct charge on provincial funds. If increased funds are necessary, they can best be provided by a slight general rise in the fees for some general examination.

*Financial position.*—I do not propose to enter into this question here, as I have already, in my letter now before Government, estimated generally the increased cost of education if the Government should determine to make a new departure on the lines now suggested. That estimate, however, is one which will only gradually be worked up to.

*Syllabuses.*—Draft syllabuses for each subject of examination are forwarded herewith. They have been very carefully compiled and collated and have, as far as practicable, been submitted for

*I may here bring to notice a plan worked by the Liverpool and Birmingham School Boards, an adoption of which might be found useful in this presidency, especially at first, when really well-qualified teachers are scarce and suitable collections of specimens and models and apparatus have to be created.

The special feature of the scheme, and one which is rightly regarded as of the very highest importance in connection with it, is that these science demonstrations are given, not by the ordinary staff of the school, but by a specially appointed expert, whose sole duty it is to go round from school to school giving practically the same lesson in each one, until all have been visited. The apparatus necessary is kept, and the experiments are prepared at a central laboratory at one of the schools, and whatever is needed for a given lesson is carefully packed in neatly partitioned boxes and is taken from school to school in a hand-cart drawn by a boy employed for the purpose. In this way the Birmingham Demonstrator, Mr. W. Jerome Harrison, F.G.S., is able to give four lessons per day, of about forty-five minutes each, in as many different schools; and at present all the thirty Board Schools, or sixty departments, are thus receiving such instruction, which is given to about 2,800 boys and 1,600 girls, from among the 17,944 who were presented for examination in 1883. Mr. Harrison has two assistants in this teaching and one laboratory assistant; and it occasionally happens that he may be teaching mechanics to boys and one of his assistants expounding domestic economy to girls in different rooms of the schools at the same time. Carriage of apparatus is thus saved. In addition to those, 485 boys are being taught magnetism and electricity, and 95 boys and 90 girls are similarly earning animal physiology, the instruction being in every case given by one of the special demonstrators.

In Birmingham, the lessons are given fortnightly. One of the regular staff of the school is always present, and it is his duty in the intervening week to go over the ground again to the class and drive the lesson home. After this each pupil writes out notes of the lesson, often in reply to questions set, and these notes are revised by the demonstrator himself before he next visits the school.

The practice of having one or more of the ordinary teachers present at the demonstration is fraught with more important consequences than at first sight appears. Their attention is thus drawn to science and to science well taught, as the following quotation from a teacher's letter to Mr Harrison will show. The writer is one of the hardest-working assistant teachers in Birmingham, and his testimony was spontaneous:—

"*I have attended eight or ten science classes and gained several certificates, but from them all I have not gained so much knowledge as by listening to your lessons.*

"*I venture to hope that this system of science teaching in elementary schools by specially-appointed demonstrators will obtain authoritative endorsement as the right one.*"

It may be objected that although feasible in large towns, such a scheme is not practically useful in the number of smaller towns scattered over the country. The objection is more apparent than real, and a little concerted action on the part of neighbouring towns would soon remove the difficulty in all but very outlying places in agricultural districts.

A very important suggestion for the better illustration of object lessons is at present under discussion in Liverpool between the School Board and the Museum authorities. It is due to the Rev. H. H. Higgins, the Chairman of the Museum Sub-committee, and proposes the utilisation of duplicate specimens of the museum for the establishment of a circulating museum. The frequent failure hitherto of small school museum has arisen mainly from the insignificant individuality of the specimens and the familiarity of the pupils with them. A specimen of considerable excellence, say a mineral, fossil, stuffed animal, or shell, will not only assist the teacher in more firmly imparting the knowledge he wishes to convey, but the beautiful and uncommon thing itself, if carefully handled, etc., by the pupils, will exercise a good moral and refining influence upon them by calling out the faculties of observation and admiration.

the consideration of experts, by whom they have been revised and, where necessary, adapted: that for agriculture, for instance, by Mr. C. Benson; that for veterinary surgery and medicine by Mr. J. Mills, those in most of the engineering subjects by Captain Love; that in organic chemistry by Dr. MacNally, that in telegraphy by Mr. Luke; that for the advanced examination in geology by Mr. Bruce Foot; those for economic entomology and for botany by Dr. Bidie; those for art by Mr. Havell; those for silversmiths' work and watch and clock making by Mr. P. Orr; those for weaving, textile fabrics, etc., by Mr. Elsässer (of the Basel Mission Weaving Establishment, Calicut) that for printing by Mr. E. Keys of the Government Press—to all of which gentlemen, and to others who have in various ways assisted, my acknowledgments are due.



*Conclusion.*—Should the proposals now made be approved, the other agencies enumerated in paragraph 5 (*a*) to (*n*) of this office letter above mentioned will be finally considered. The revision of the general curriculum in result schools (*a*), the Grant-in-Aid Code Committee has already dealt with up to the standard of the middle school; the upper secondary alone remains to be dealt with. Schemes already sketched in the rough will also be submitted for (*e*) and (*f*), the development on the lines there indicated of the Agricultural College and of the School of Arts, and for (*h*), the removal of the Madras Government Normal School to Saidapet with a view to some of the students being trained as teachers of agriculture or general science. If Government comes to the decision to fix certain of the examinations as passports to certain branches of Government service, proposals will be submitted as to the details. The steps to be taken as to the evening lectures proposed in 5 (*n*) will perhaps be better considered when the science teaching staff of the Madras colleges has been strengthened and the services of a larger number of qualified lecturers and demonstrators is available.

Should the general scheme as embodied in the notification now submitted be approved and sanctioned, I request sanction for the constitution of a small committee consisting of officers of Government and of other scientific gentlemen to settle finally the details of the courses and the exact character of the syllabuses. I do not think, after the care which has been taken in obtaining the best available opinion on nearly every syllabus, that any material alterations are likely to be suggested in most of them, but the final approval of such a body will, I cannot doubt, secure wider confidence in the scheme.

In conclusion, I would add that the proposals made in my letter recorded in the order under reply have been generally endorsed by most of the educationalists consulted, and I think I cannot better conclude this communication than by quoting from the reply of Dr. Willy, Rector of St. Aloysius' College, Mangalore:—

"The supply of Government appointments does not keep pace with the ever-increasing demand, and yet parents seem daily even more eager to push their boys on to higher studies, hoping against hope for Government service. Pinching want blinds them in the pursuit of chimerical hopes; on the other hand, a feeling of degradation holds back many of our Christians of South Canara from manual work as being unbecoming their position as Brahmins.

"Now, by connecting industrial professions with schools and Colleges, those very professions hitherto looked down upon would in their eyes become ennobled, parents and boys would take kindly to them, and thus an outlet would be found for their pent-up energies into some congenial channel, profitable and honourable alike to the people.

"2. As regards my college some of the professions mentioned in your circular, such as printing and binding, drawing and music, could, I feel sure, under certain circumstances, be started in connection with the schools."

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## ENCLOSURES.

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### DRAFT CHAPTER OF THE GRANT-IN-AID CODE.

GRANTS-IN-AID OF TECHNICAL EDUCATION IN SCIENCE, ART, AND INDUSTRIES.



*Objects.*—1. The General objects for which grants for promoting technical education are given are set forth in paragraph 2 of Government notification dated regarding higher examinations in science, art, and industries.

2. The means for attaining these general objects are—

(i) In regard to science—

(*a*) the establishment of applied science classes and of museums, laboratories, demonstration farms and workshops in connection with existing recognised colleges and high schools, affording general instruction, such science classes being optionally day or evening classes, and being available both for the ordinary pupils of the colleges and high schools and for outsiders:

(*b*) the introduction of science as part of the curriculum in middle schools, and of children's occupations developing manual dexterity, and of object lessons developing habits of accurate observation and description, as part of the education given in primary schools.

The science subjects for instruction in which science schools or classes will receive aid are stated in paragraph 12 of the above notification:

(ii) In regard to art—

(*a*) the establishment (ordinarily in connection with existing high schools and colleges) of industrial art classes; and

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(b) the introduction of drawing and modelling into the curriculum of middle schools and of drawing into that of primary schools ;

(c) the establishment of schools of industrial art in large centres where a sufficient number and variety of students can be found.

The art subjects for instruction in which aid will be given are detailed in paragraph 12 of the notification above referred to.

(iii) In regard to industries—

(a) the establishment of industrial schools in which, as far as practicable, science and art are applied to the improvement of the industries, and in which correct principles are taught as well as improved practice :

(b) the establishment of industrial classes in connection with existing high schools and colleges, especially in connection with those having science and art classes.

The industries for instruction in which aid will be given are enumerated in paragraph 12 of the notification above referred to and in the Middle School Notification.

3. *Nature of Aid.*—The assistance rendered to science, art, and industrial education under this chapter, and in addition to aid given under other chapters of the code, is in the form—

(i) of scholarships, medals, and prizes awarded in public examinations held at places complying with the conditions laid down in the Government notification ;

(ii) of other stipendiary and also free scholarships ;

(iii) of special and more liberal salary grants for teachers ;

(iv) of payments on the results of examinations and on attendance ;

(v) of aid to ordinary teachers and normal students attending the Saidapet Agricultural College, and the Madras School of Arts or the Madras Civil Engineering College, and of aid to passed students of those institutions and science graduates attending the Madras Normal School, with a view to qualify as teachers of science, art, or industries respectively ; and

(vi) of grants towards the rent or purchase of land for demonstration farms.

4. *Conditions of Aid.*—No. (i) Special *Scholarships, Prizes, etc.*, for science, art, and industries will be given according to the conditions laid down in the Government notifications.

No. (ii) *a.*—To managers of industrial schools, scholarships at the following rates will be given for students, who, having passed the highest industrial standard in the Middle School examination, are sent to a recognized art school to continue their studies to the preliminary higher examination with the view of becoming industrial teachers :—

| European— | Rs. | Others— |
|---|---|---|
| 1st year . . . . . . | 10 | Rs. 8 |
| 2nd „ . . . . . . | 12 | „ 10 |

*b.* Free scholarships in the Government School of Arts will be awarded to any such students sent to pursue his studies only, and not with the view of training as a teacher.

No. (iii). *Salary grants for teachers* in science, art and industrial education will be given according to the rules contained in chapter II. The qualifications required in science and art teachers will be found in articles 38 to 43 of chapter II, and in paragraph 22 of the notification. Industrial teachers must ordinarily have passed a general education test, and be approved of by the Director of Public Instruction as competent teachers of the industries they profess, but the Director of Public Instruction may, under special circumstances and on the recommendation of an inspector of schools, dispense with the first condition. [*N.B.*—After December 1888, science, art or indutrial teachers in special schools or classes will, as a condition of salary grant for teaching any branch of industry, or of science or art applied to the industries, be requried to have passed in one of the Government public higher examinations in that branch. The same requirement will be made in the case of science or art teachers in middle school; and science or art teachers in upper primary schools will similarly be required to have passed at the Middle School examination.] For those teachers who, in addition to fulfilling the requirements of the Director of Public Instruction in regard to their special qualifications in science, art or industry, hold a Normal certificate or the university diploma L. T., there will be given in addition the half grant, and similarly 25 per cent. extra will be given to those who hold an ordinary certificate.

No. (iv). In addtion to any other grants obtainable under the code, *Result grant* (up to the 7th standard Middle School examination) will be given according to chapters III and IX of the Grant-in-Aid Code. For the higher examinations in science, art, and industries the result grant shall be as follows :—

For each pupil passing the preliminary higher examination Rs. 8 in the 2nd class, and Rs. 12 in the 1st class for each subject in which there are no stages, and Rs. 4 and Rs. 6 respectively, for each stage of subject divided into stages. Provided that no grant shall be claimable for the first stage in PURE MATHEMATICS. And the same for subjects in which there is only one higher examination. For the advanced higher examination double the above amounts. Fifty per cent. extra on the above rates will be given for girls and Muhammadan boys.

*N.B.*—No result grant will be given for those who have already passed an examination recognized as equivalent or higher.

No. (v). *Aid to teachers attending special colleges or schools* with a view to qualify as science, art or industrial teachers will be given at the rates fixed for, and subject to the conditions applicable to Normal students under chapter VI.

No. (vi). Grants towards the rent or purchase of land for demonstration farms will be give under the conditions laid down in chapter X.

No. (vii). Grants are only made to schools in connection with the department approved and recognized by it, and complying with the conditions of section (*a*), chapter II.

5. *Conditions of Recognition as Science, Art or Industrial School or Class*—To qualify a school or class to be recognized as eligible for aid as a science school or class, art schools or class, or industrial school or class respectively, it must comply with the following conditions :—

(*a*) It must, even if seeking a result grant only, be under science, art or industrial teacher qualified as hereinbefore mentioned.

(*b*) If a salary grant is sought for the teacher of a science, art or industrial class, he must have under him, and in regular attendence, not less than six pupils studying science, art or industries. But these six need not necessarily be all studying the same subject provided that in each subject taught the teacher has the required qualifications. There is no limitation as to the number of pupils when only a result grant is sought.

(*c*) Pupils admitted into science or art schools or class (unless specially exempted by the Director of Public Instruction) must have passed the middle school examination or some examination accepted by him as equivalent or higher. No science or art school or industrial class shall continue to receive aid which, if it is a day school or class, has not had 100 full school meetings (as defined in article 75 of the code) during the 365 days precedin the examination, or, if a science or art class (day or evening) or an evening industrial class, has not during the above mentioned 365 days had 50 full meetings of two hours each.

(*d*) Except in industrial schools and classes, a fee must be levied at rates to be apporved of by the Director of Public Instruction, and if any free scholars are allowed, the number must not exced a percentage to be fixed by the Director of Public Instruction. The manager must certify annually to the collection of fees. But no fee shall be levied from Normal students attending a science, art or industrial class or school.

(*e*) The school or class must possess a sufficient supply of the fittings, plant, and apparatus, etc., requisite for teaching the subjects professed, and if Chemistry is taught there must be a suitable laboratory, and if Metallurgy, suitable furnaces as well. Every science or art school must possess a sufficient collection of suitable specimens, models etc. But several schools or classes may unite to circulate their collections among each other, so as to bring a larger collection before the notice of the students of each, and individual deficiencies may thus be made up for, and similarly with regard to apparatus not in daily requirement.

(*f*) A science or art school or class which omits to present pupil at the public higher examinations in science and art of any year, or from which for two successive years no pupils pass thereat, will be liable to have its salary grant or grants withdrawn or reduced.

Industrial schools or classes shall similarly be bound to present and pass pupils at the industrial examination from the 4th to the 7th standards under chapter IX, under penalty of the grant being withdrawn or reduced.

6. *Rewards to Teachers.*—The Director may grant an honorarium of not more than three months' salary to a certificated teacher in an ordinary college or secondary school who qualifies in science, art or industries by passing for a teacher's certificate in one of the higher examinations under paragraph 22 of the Government notification.

7. *Grants to Teachers under Training.*—Certificated teachers in receipt of salary grants as teachers of ordinary colleges or secondary schools who may wish to attend a special course at the Saidapet Agricultural College, the Madras School of Industrial Arts, or the Madras Civil Engineering College, will be eligible for the continuance of their grant during the course, and if resident in the mofussil, to actual travelling expenses to Madras and back. The above concession will be dependent on the principal of the institution reporting that the progress of such students is satisfactory, and that they are likely to pass the next ensuing preliminary higher examination.

8. *Payments on Attendance.*—Payments on attendance will be made only in fully organised science schools and in fully organized art schools. The condition on which such grants will be made and the amount thereof will be notified hereafter.

9. *Travelling Allowance to Teachers.*—A teacher giving instruction in science, art or Industry in several small towns or in several schools in a large town, may receive special grants-in-aid for his travelling expenses. These special grants are only to be made provided that there is local organization for a general system of science, art or industrial instruction, that the teacher is highly qualified, and that local teachers possessing the requisite qualifications are not available.

When it is intended to claim this grant, a special application must be made at the beginning of the official year, explaining the circumstances of the case, and giving a detailed estimate of the expenses which will be incurred. The application will then be considered, and if the circumstances bring it within the above regulation, the Director of Public Instruction will allow a certain sum, not exceeding two-thirds of the amount, for each journey. The whole allowance will be paid at the end of the official year upon the production of satisfactory vouchers that the travelling expenses have been actually incurred, and that the class has been examined.

It must, however, be clearly understood that this gives no claim for travelling expenses generally, and that no claim will be entertained which has not been allowed by the Director of Public Instruction at the commencement of the session.

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## NOTIFICATION.

### Higher Examination in Science, Art, and Industries.

1. With a view to give effect to the instructions of the Government of India as contained in their Resolution, $\frac{18}{38}$ of the 23rd October 1884, Higher Examination in various branches of

No. 9. MADRAS Technical Scheme, 1885.

TECHNICAL SCIENCE and ART and in INDUSTRIES will be held in Madras once a year, commencing on the last Monday in May.

2. THE OBJECT of Government in instituting these examinations is to encourage advanced instruction in science and art, especially in those kinds of knowledge which bear upon the different branchs of industry now existing in this presidency or suitable for it, and to furnish a means of testing wholly, or in part, the qualifications of persons desirous of becoming—

I. (a) Science, (b) Art, or (c) Technical, } Teachers; or

II. Mechanical engineers; electrical engineers; telegraphists; builders; designers; engravers; decorative or art workmen in any branch of artistic industry included in this notification; or

III. Scientific agriculturists; foresters; veterinarians; or

IV. Managers or foremen of manufacturing, printing and other industrial establishments suitable for this presidency; or

V. Employés in posts in the Revenue, Revenue Survey, Public Works, Education, Agriculture, Forests, Sanitation, or other Departments which require a practical knowledge of any of the branches of science, art or industry in which it is proposed to examine, and for employment in which Government may, from time to time, see fit to recognize these examinations as a test; or

VI. Employés in similar posts under Local Fund Boards or Municipal Councils, or under private employers.

3. THE KIND OF SCIENTIFIC INSTRUCTION that it is proposed to test, differs from that given in connection with the university examinations in this, that what is contemplated is not so much abstract science or science studied merely for the extension of knowledge and enlargement of the mind, but science with a view to its application to various manufactures and other industries. Similar remarks apply to the art examinations.

4. THE EXAMINATIONS shall be conducted by Boards of Professional Examiners appointed by the Commissioner for the Uncovenanted Civil Service Examinations, and shall be under the control and direction of that officer, to whose office all communications regarding the examinations should be addressed.

5. The examinations may, at the discretion of the Commissioner, be held at places other than Madras. Of such places, a list will be published in the *Fort St. George Gazettee* annually in the month of June.

6. Applications for Admission must reach the office of the Commissioner before the 15th of February preceding, and must be on the printed form to be obtained as hereinafter prescribed (section 23). The application must be accompanied by a certificate of the applicant's having passed the Middle School examination, or some examination accepted as equivalent or higher, and by the district treasury officer's receipt for the fee.

7. The fee shall be as follows:—

When only one subject is brought up, the fee shall be R5 for the preliminary higher examination and R8 for the advanced higher examination; when two subjects are brought up at any one examination the fee shall be R4 for each subject of the preliminary examination, and R6 for any subject of the advanced examination, and similarly the fee shall be R3 and R5, respectively, for each subject when three or more subjects are brought up at one examination. No deduction will be made when an additional subject is brought up in a succeeding year.

The Preliminary Higher and the Advanced Higher examinations in Mathematics, and certain other of the examinations are each sub-divided into two stages, first and second. The fees for examination for each stage shall be as follows:—Preliminary examination, first and second stages, R2. Advanced examination, first stage, R3, second stage, R4.

THE PRELIMINARY HIGHER AND ADVANCED HIGHER EXAMINATIONS IN DRAWING AND PAINTING are each divided into three stages; the fees for examination shall be as follows:— Preliminary higher examination, for each stage, R2. Advanced higher examination, for each stage, R4.

8. THOSE WHO PASS the examinations will receive SINGLE SUBJECT CERTIFICATES, GROUP CERTIFICATES OR DIPLOMAS (see paragraphs 15, 16, and 17), and to some there will, under certain conditions, be given also PRIZES and REWARDS (see paragraphs 19 and 21), and SCHOLARSHIPS (see paragraph 20). The teachers of passed candidates will be eligible for GRANTS under the Grant-in-Aid Code. (See Grant-in-Aid Code.)

9. In connection with these examinations, SCIENCE TEACHERS, LECTURERS AND DEMONSTRATORS will, as opportunity serves and funds allow, be provided in every Government college, which will be provided also with COLLECTIONS OF APPARATUS AND SPECIMENS and with LABOROTARIES. Encouragement will be given to all recognised colleges and high schools to make similar provision, and to Local Fund Boards and Municipalities to establish DEMONSTRATION-WORKSHOPS AND FARMS in connection with the above teacherships and lectureships, so that theoretical instruction may be supplemented by a certain amount of the necessary actual practice.

10. In each branch of INDUSTRY, in MODELLING and in MUSIC, there shall for the present be only ONE HIGHER EXAMINATION, which shall be the final examination in those branches. IN THE SCIENCES there shall be TWO EXAMINATIONS, one the Preliminary higher, and the other the advanced higher examination. In PURE MATHEMATICS the two examinations shall each be divided into two stages, making altogether four examinations in that branch. In DRAWING AND PAINTING the two examinations will be divided each into three stages, making altogether six examinations in that

branch. The examinations will be so arranged as to allow a diligent candidate of fair capacity to pass the preliminary higher examination in from two to three years after his passing the Middle School examination, and the advanced higher examination in from two to three years after his passing the preliminary examinations. Candidates will not, however, be restricted, as yet, to any definite time of preparation, and provided they have passed at the Middle School examination (or have passed some examination accepted as equivalent or higher), will be at liberty to come up in any year for the preliminary higher examination, except so far as the rules of the institution in which they are studying preclude. The same restriction applies to students of institutions sending up candidates for the advanced higher examination in a branch, as the final test of the course. But every candidate allowed to present himself for the advanced higher examination in any branch must have passed either the preliminary examination in that branch, and in any other branches declared requisite, or some other examination or examinations accepted as equivalent, or higher, or have completed in a technical institution a course of study accepted as equivalent by the commissioner. Candidates may, at both the preliminary and advanced higher examinations, come up in more than one branch, either in the same or following years, and may, after passing the advanced higher examination, come up for the preliminary higher examination in any branch other than those in which they have passed the advanced examination. Candidates who have passed in a lower class in any subject, may come up again to qualify for a higher class, but candidates must each time of such re-examination, pay again the full examination fee prescribed in paragraph 7.

11. Students of SCIENCE will find it to their advantage to have, before coming up for the preliminary higher examination, that amount of general education which is implied by passing the MATRICULATION EXAMINATION of the Madras or other Indian university and similarly candidates for the advanced higher examinations in science should possess an amount of general education equal to that implied by passing the F. A. EXAMINATION.

12. The separate SUBJECTS in which examinations will be held are as follows:—

NOTE 1.—Till further notice, no examinations will be held in those branches whose names in the list are enclosed in square brackets [ ].

NOTE 2.—Advanced examinations will for the present be held in those branches only whose names in the list are printed in CAPITALS.

NOTE 3.—For each branch there is published a syllabus of the knowledge required for the examinations, preliminary and advanced respectively, and such syllabuses can be had at the Madras School Book Society's Depôt.

Subject—

1. PURE MATHEMATICS. *
2. PRACTICAL PLANE AND SOLID GEOMETRY. *
3. Mensuration. †
4. MECHANICS (THEORETICAL). *
5. MECHANICS (APPLIED). *
6. HYDRAULICS AND HYDRAULIC ENGINEERING. *
7. BUILDING MATERIALS AND CONSTRUCTION. *
8. Plan-drawing from Specification and Estimate making. †
9. LAND SURVEYING AND LEVELLING. *
10. Earth-work, Road-making, and Railway-making. *
11. Bridge-making. †
12. Principles of Mechanism. †
13. Machine Construction and Drawing. *
14. Steam. *
15. Heat. *
16. [ Light. ]
17. [ Sound. ]
18. Metallurgy. *
19. MAGNETISM AND ELECTRICITY. *
20. Practical Telegraphy. *
21. Electrical Engineering. *
22. Electrical Instrument-making. *
23. Electro Metallurgy. *
24. CHEMISTRY (INORGANIC).*
24. Do. (Organic). *
26. Geology. *
27. [ Mineralogy. ]
28. PHYSIOGRAPHY. *
29. [ Principles of Mining. ]

Subject—*contd.*

30. AGRICULTURE. *
31. Animal Physiology. *
32. VETERINARY SURGERY AND MEDICINE.
33. Botany. *
34. Economic Entomology. *
35. Forestry. *
36. Biology, including Animal and Vegetable Morphology and Physiology. *
37. [ STATE MEDICINE (HYGIENE) ].
38. DRAWING AND PAINTING. *
39. Modelling. †
40. ‡ Engraving and Etching. *
41. Photography. *
42. Printing. *
43. ‡ Carpentry and Joinery.*
44. Cabinet making and Turning. †
45. Carriage Building. *
46. Boot and Shœ making. *
47. Tanning Leather. *
48. ‡ Silversmith's and Jeweller's work. *
49. Watch and Clock making. *
50. ‡ Weaving and Pattern designing. †
51. Textile Fabrics. *
52. Cotton Manufactures. *
53. Silk Manufactures. *
54. Bleaching, Dyeing and Printing and Cotton. *
55. Silk Dyeing. *
56. 4 Carpet-weaving. †
57. † Pottery and Porcelain. *
58. Glass-making. *
59. Paper-making. *
60. [ Music. ]

13*a*. The QUESTIONS shall not in number or difficulty be more than a candidate of decided ability can answer within the time allowed. But the questions both in the written examination and the *vivâ voce* shall be such as not to be capable of being answered merely from memory, but shall test the candidate's ability to intelligently apply the principles he has learned. And no candidate shall receive marks in any science, art or industry subject who, in the opinion of the

* Syllabus published. † Syllabus will be published.

‡ In connection with the examination in these Industries there must be brought up Drawing or Modelling or both (as the case may require) sufficient for the industry.

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examiners, fails to show such an understanding of its principles as is necessary for a useful practical application thereof.

13*b*. In such sciences as admit thereof the examination shall have a PRACTICAL SIDE, and arrangements shall be made for testing the candidates *vivâ voce* as well as by written papers. In all subjects, the candidates will be liable to be called upon to produce diagrams similar to those given in the ordinary text-books.

13*c*. No candidate shall pass in science, who does not obtain one-third of the marks assigned to the practical test of the subject he elects.

NOTE.—The examinations will for the present be held only at places where facility exists for the practical and *vivâ voce* examinations.

14. LISTS OF THE SUCCESSFUL CANDIDATES shall be published in the *Fort St. George Gazette*, one list in three classes for each subject; candidates obtaining above 60 per cent. being ranked in the first class, those obtaining over 45 per cent. in the second class, and those obtaining over 35 per cent. in the third class. Candidates in the first and second classes shall be ranked in order of merit, and those in the third class in alphabetical order. In the case of institutions sending up students for examination in a group of subjects as a test in the preliminary or final course of study in such institutions, a separate group list will be published. For passing in such test the candidate must obtain at least two-fifths of the marks in the principal subject of the groups, one-third marks in each other subject, and one half on the aggregate. The names of candidates passing will be included also in the separate subject lists.

15. To candidates successful in the preliminary higher examinations, and in the advanced higher examinations, except as in the groups named below, there shall be given paper SINGLE SUBJECT CERTIFICATES signed by the Commissioner for the Uncovenanted Civil Service Examinations, or an officer deputed by him.

16. To candidates successful in the groups of examinations named below or in any industry there shall be given parchment GROUP or INDUSTRIAL CERTIFICATES, signed as above.

Group and INDUSTRIAL certificates will certify that the holder is qualified to earn his livelihood by some profession or trade.

## PRELIMINARY OR LOWER GROUP TESTS.

### *Group A.*—AGRICULTURE AND THE ALLIED SUBJECTS.

AGRICULTURE (preliminary), with Botany (preliminary), Inorganic chemistry (preliminary), Physiography (preliminary), pure mathematics (first stage), Mensuration (preliminary), Animal Physiology (preliminary), and Physiography (preliminary).

### *Group B.*—FORESTRY AND THE ALLIED SUBJECTS.

FORESTRY (preliminary), with Botany (preliminary), Surveying and levelling (preliminary), and Physiography (preliminary).

### *Group C.*—VETERINARY SURGERY AND MEDICINE.

VETERINARY SURGERY AND MEDICINE (preliminary), with Inorganic and Organic chemistry (preliminary), Animal physiology (preliminary), and Botany (preliminary).

### *Group D.*—GEOLOGY AND THE ALLIED SUBJECTS.

GEOLOGY (preliminary), with Mineralogy (preliminary), Physiography (preliminary), and Surveying and levelling.

### *Group E.*—BUILDING, CONSTRUCTION AND THE ALLIED SUBJECTS.

BUILDING MATERIALS AND CONSTRUCTION (preliminary), with Applied Mechanics (preliminary), Earth-work, Plan-drawing from specifications and estimate-making, Surveying and levelling (preliminary), and Carpentry.

### *Group F.*—MACHINE CONSTRUCTION AND DRAWING, AND THE ALLIED SUBJECTS.

MACHINE CONSTRUCTION AND DRAWING (preliminary), with Steam (preliminary), Heat (preliminary), Mechanics, theoretical and applied (preliminary), and principles of Mechanism.

### *Group G.*—METALLURGY AND THE ALLIED SUBJECTS.

METALLURGY (preliminary), with Inorganic chemistry (preliminary), Heat (preliminary), and Physiography (preliminary).

### *Group H.*—MINING AND THE ALLIED SUBJECTS

PRINCIPLES OF MINING (preliminary,) with Mineralogy (preliminary), Geology (preliminary), Physiography (preliminary), Building materials and construction (preliminary), Surveying and levelling (preliminary), Plan-drawing from specifications and estimate-making, Earth-work, Road-making, and Railway-making (first stage), Machine construction and drawing (preliminary), Steam (preliminary), and Heat (preliminary).

*Group* J.—ELECTRICITY AND THE ALLIED SUBJECTS.

MAGNETISM AND ELECTRICITY (advanced), with Pure mathematics (preliminary), Machine construction (preliminary), and with either TELEGRAPHY or ELECTRICAL INSTRUMENT-MAKING or ELECTRO METALLURGY.

*Group* K.—SANITATION WITH THE ALLIED SUBJECTS.

STATE MEDICINE (preliminary), with Veterinary surgery and medicine (preliminary), Biology (preliminary), and Physiography (preliminary).

17. To candidates passing in at least the second class in the group of higher examinations named below, DIPLOMAS signed by His Excellency the GOVERNOR, or an officer deputed to sign for him shall be given.

The holders of art diplomas shall be styled Associates of the Madras School of Arts, and the holders of the other diplomas, Chemistry excepted, shall be styled, Associates of the Madras College of Agriculture.

DIPLOMAS will be given for the following groups of branches of Technical Science and Art:—

## ADVANCED GROUP TESTS.

(*Agriculturist's Diploma.*)

*Group* (i)—AGRICULTURE (advanced), with Botany, Physiography (preliminary), Economic entomology, Geology (preliminary), Inorganic chemistry (advanced), Organic chemistry (preliminary), Forestry (preliminary), Animal physiology (preliminary), Veterinary surgery and medicine (preliminary), Pure mathematics (first and second stages), Mensuration, Building materials and construction, Road-making, Applied mechanics (preliminary), Surveying and levelling, Plan-drawing from specification and estimate-making, and Hydraulic engineering (preliminary).

(*Forester's Diploma.*)

(ii) FORESTRY (advanced), with Botany (advanced), Economic entomology, Physiography (preliminary), Geology (preliminary). Inorganic and Organic chemistry (preliminary), Heat, Electricity [frictional] only (preliminary), Mensuration, and Surveying and levelling (preliminary).

(*Veterinarian's Diploma.*)

(iii) VETERINARY SURGERY AND MEDICINE (advanced), with Animal physiology (advanced), Biology (advanced), Inorganic and Organic chemistry (advanced), and Botany.

(*Chemist's Diploma.*)

(iv) CHEMISTRY inorganic (advanced), and Organic (advanced), with Heat (preliminary), Light (preliminary), and Physiography (advanced).

(*Art Diploma.*)

(v) DRAWING AND PAINTING (advanced), with Modelling or Engraving and Etching.

18. Students of the MADRAS COLLEGE OF ARICULTURE shall undergo the examination in the principles of agriculture and the other branches taught in the college, preliminary higher or advanced higher, according as they are certified to have completed the lower school or the college course, and, if they pass, will receive certificates and diplomas respectively. Veterinary students of the college shall similarly appear for the preliminary or advanced higher examinations in veterinary surgery and medicine. Students of the MADRAS SCHOOL OF INDUSTRIAL ARTS shall undergo the preliminary higher or advanced higher examinations in the branches of art or industry in which they are certified to have completed the course at that institution, and if they pass, shall receive certificates or diplomas as the case may be.

19. In each subject, PRIZES will be given if, in the opinion of the examiners, any candidates shall possess sufficient merit.

To the candidate who, in the preliminary examination, passes highest in the presidency and is not more than 22 years of age at the date of examination, shall be given—

A gold ring or medal of the value of R35, if he passes in the first class.

A gold ring or medal of the value of R25, if he passes in the second class.

A silver medal of the value of R15, if he passes in the third class.

To the candidate who passes highest in the advanced examination and is not more than 25 years of age on the date of the examination, shall be given—

A gold ring or medal of the value of R50, provided he passes in the first class.

A gold ring or medal of the value of R35, if he passes in the second class.

A gold medal of the value of R20, if he passes in the third class.

[In Mathematics prizes will be given only in the advanced higher examination.]

Similarly to the candidates who pass second and third in each subject, similar prizes of proportionately less value will be given on similar conditions; the lowest prize to be a bronze medal.

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20. If, in the opinion of the examiners, candidates show sufficient merit in any subject (exclusive of Pure Mathematics and Physiography) to the first three of those candidates who stand at the head of the list of those who pass in that subject at the preliminary examination in any year, SCHOLARSHIPS of R12, R10, R8, respectively, per mensem for next two years will be given, provided they have passed in subjects in which there is an advanced examination, and continue to study it in a recognized science school or class.

No candidate shall be allowed a scholarship in science who has not either at the preliminary examination itself, or at some examination accepted as equivalent, passed in the first stage of pure mathematics and of drawing respectively, and in one at least of the science subjects of the Middle School examination.

NOTE.—The object of this restriction is that the student before commencing an advanced science course should have acquired such familiarity with the rudiments of mathematical and of general physical science, and with practical draughtsmanship as shall enable him to enter with advantage on higher scientific studies.

But no student shall be allowed to hold at the same time more than two scholarships, but if eligible for more than two at the same time, he shall elect which two he will hold, the scholarship or scholarships rejected passing to the next in order, if, in the opinion of the examiners, he shows sufficient merit.

21. Candidates who pass the preliminary examination in the first or second class in more than one science subject (exclusive of Pure Mathematics and Physiography), and who, in the opinion of the examiners, show sufficient merit, shall for each additional subject in which they pass, receive REWARDS of R12 or R6 according as they pass in the first or second class. No reward will be given for a pass in the third class in an additional subject, but the first two candidates standing at the head of the third class in an extra subject, will, provided they have at the same examination pass first or second class in another subject, be admitted as free scholars in any Government science school or class.

22. Higher or lower grade CERTIFICATES OF CAPACITY AS TEACHERS of art, science or industry schools or classes, will be given to those who pass (*a*) in at least the second class of the preliminary or advanced examinations respectively, and (*b*) in such examinations as may be prescribed in the principles of teaching, discipline and class-management, and in teaching a class before a Government inspector of schools. Those desirous of obtaining such certificates of capacity as teachers of science, art or industry will find it to their advantage to attend a short course at a Government or other recognized secondary normal school. Such candidates for teacherships of art, science or industries, will receive a monthly stipend of R15 per mensem while under training at a Government or other recognized Normal school.

[Certificated science teachers, art teachers and teachers of industries in any recognized college or school, Government or aided, will be eligible for grants under the Grant-in-Aid Code. Grants to holders of Normal certificates are higher than to holders of ordinary certificates.

23. Candidates must send in their application for examination *on printed form*, which may be obtained from all tahsildars and treasury deputy collectors. Distinct forms, marked A, B, C, D, E, F, G, H, J, and K, respectively, will be supplied to candidates—

(1) Male pupils of the fifth class of a Government school or college (or of a corresponding class in a hitherto recognized private school or college) will be required to make their applications on form A;

(2) Female pupils in similar classes, on form B; and

(3) Pupils in special schools or classes, who do not attend an ordinary school or college and who are not artizans, on form C, if males; on form D, if females.

(4) Artizans attending special classes, on form E, if males; on form F, if females.

(5) Artizans not attending special classes, on form G, if males; on form H, if females.

(6) All other candidates on form J, if males; on form K, if females.

24. This notification will come into effect from the 1st June 1885.

## *No. 9(a).—Resolution of the Government. of Madras.*

ORDER—dated 3rd June 1885, No. 377, (Educational).

His Excellency the Governor in Council recognises, in the scheme now submitted by the Director of Public Instruction, another great step towards a sound system of education for South India. The opening of a new outlet for ability is of the most paramount social and political importance. The Government approve of the notification and draft syllabus submitted by Mr. Grigg, and desire to place on record their high appreciation of the care and trouble taken in drawing up the present scheme.

2. The Director of Public Instruction will submit the names of those gentlemen he would wish to see appointed to the committee proposed for settling the final details as to the courses to be followed and the exact character of the syllabuses. The notification cannot, of course, come into effect until after the report of the above committee has been submitted.

3. The Government approve of the draft chapter of the Grant-in Aid-Code, but desire that it should be clearly laid down that grants in-aid will be given for the erection of laboratories and the provision of apparatus.

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4. The Government further approve of the gradual extension of work proposed in the Agricultural College and School of Arts. They do not, however, desire that any measures should be taken towards extending the scope of the work done at the Engineering College. That institution is now providing a sound engineering education, and its further development may be left to the future. The gradual encouragement of art classes in mofussil colleges is sanctioned, and the proposed carpentry class in the Rajahmundry College may be at once opened as an experiment.

5. The removal of the Normal school to Saidapet is approved.

6. Although the Director of Public Instruction specially requests the orders of Government with reference to making certain examinations a passport to employment in certain branches of the Government service, it is not quite clear what his suggestion is. He should state in detail the nature of his recommendations.

7. With reference to the communication from Mr. Symonds, the Government are of opinion that any enquiry of the nature he proposes would probably be of little avail so far as adults are concerned. The obvious remedy for the rising generation is, as he has observed, the technical instruction of the children, and this is what the Government hope will be provided by the present scheme.

(True Extract.)

E. F. WEBSTER,
*Chief Secretary.*

To the Director of Public Instruction.
„ W. A. Symonds, Esq.

# BOMBAY.

## No. 10. Resolution of the Government of Bombay on Technical Education.

No. 1481 B., dated the 15th September 1886.

From—Sir WILLIAM WEDDERBURN, BART., Acting Chief Secretary to the Government of Bombay,

To—The Secretary to the Government of India, Home Department.

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I am directed to acknowledge the receipt of your letter No. $\frac{7}{211}$, dated the 23rd July 1886, forwarding copy of a Memorandum on the subject of Technical Education in India, and enquiring what steps, having due regard to financial considerations, this Government would propose to take for giving effect to the suggestions made in the Memorandum.

2. In reply, I am to forward the accompanying copy of a Resolution No. 3-E., dated 15th instant, passed by this Government on the subject of Technical Education in this Presidency and to add that in arriving at the conclusions therein stated, His Excellency the Governor in Council has given due consideration to the present financial situation.

No. 3-E., dated Bombay Castle, the 15th September 1886.

RESOLUTION OF GOVERNMENT.

Government have for some time had under consideration the important subject of technical education in this Presidency. The practical questions that require to be considered appear to be such as the following :—

What are the classes which most require technical education, and are best fitted to receive it? What are the teaching agencies now at the disposal of Government, and how can they best be strengthened and developed so as to satisfy existing needs? What new agencies should be called into existence for the purposes either of teaching, examination or control?

2. Before proceeding to consider these practical points it will be well to state briefly the views of Government on the general question.

Technical education cannot be better defined than it was by Mr. Scott Russell :—" It is necessary that each individual shall in his own special profession, trade, or calling know more thoroughly its fundamental principles, wield more adroitly its special weapons, be able to apply more skilfully its refined artifices, and to achieve more quickly and economically the aims of his life, whether it be commerce, manufactures, public works, agriculture, navigation, architecture." Technical education aims at teaching the application of the principles of science and art to obtain certain results. Technical education is therefore entirely dependent on the previous acquisition of those principles. It is not a substitute for a good general education but an adjunct, and in its highest development it would even go beyond the University. In a certain sense a Technological Institute presupposes the acquisition of the B.Sc. Degree.

In the report of the Royal Commission of 1884, there is now available the fullest information regarding the history of the movement in Europe, and regarding the institutions which have there been found most effective. But in dealing with this information it must be borne in mind that the existing circumstances in Europe, and the objects there aimed at, are widely different from those in India. Thus in England there is an enormous wealth of manufactures, workshops and unorganized technical instruction already in existence, and the question is how to organize, economize, and improve it so as to meet the rivalry of the continent. The circumstances of India, it is obvious, are very unlike those of England. India is essentially an agricultural country, the agriculturists being hitherto in this Presidency for the most part small peasant-holders with little or no capital at their disposal, and under these circumstances it is not surprising that the scientific and manufacturing developments of the community are backward. It thus happens that except in Bombay, where certain industries are considerably developed, the experience obtained from Europe is not altogether applicable to this Presidency. At the outset it must be accepted that technical education cannot create manufactures ; it forms merely the adjunct of good general education for the supply of skilled labour to the demand of capital which is an indispensable factor, and of the enterprising spirit

which does not shun incurring the risk which attends such investments of capital. Technical schools create a directive power but the power must find at hand a sphere in which it is to be exercised. They aim also at counteracting the defects due to the specialisation of work which division of labour practically necessitates. The artificer cannot miss the larger grasp which theoretic knowledge must give a man who has acquired a mastery over a single detail of his craft. Technical education followed in Europe the existence of trades or crafts. In India there are a number of languishing crafts highly artistic in their nature, distinguished by a high degree of excellence in the disposition of form and colour and with a well marked individuality peculiar to the country The first desideratum for reviving them is capital.

The prudent way of proceeding seems to be by careful enquiry through local committees, to ascertain local and special wants, and to provide for these wants practically as they arise. This can best be done by developing the scientific element in existing institutions; and by encouraging the establishment of new aided institutions, which will be thoroughly in harmony with Indian Society as it now exists, which will keep touch with native managers, foremen and artisans of all kinds as they are; improving them gradually, increasing their number and developing their ingenuity and their taste. And in providing the organisations and equipment of such new institutions care must be taken to distinguish between two kinds of technical schools according as the object is (*a*) disciplinary or (*b*) professional. In the first the main principles are taught and tools common to several or all industries are merely utilised to illustrate what is taught, and the object in view is to give the pupil such preliminary training as shall enable him, when he afterwards selects his occupation and enters the workshop to make much faster and more intelligent progress then he otherwise could have done. In the second the object is to teach one particular art or industry with such completeness that the pupil will be able at the end of his training to begin to practise it for a livelihood.

3. With these preliminary remarks the consideration of the practical question stated at the commencement may be resumed. And with reference to the classes requiring technical education, the subject may be roughly divided into three branches, according as the teaching relates to (1) agriculture, (2) art industries, and (3) mechanical industries.

4. Taking these in their order, it may be at once decided that the College of Science at Poona shall be the central institution for the teaching of higher agriculture, local classes and schools being established to serve as feeders to the College. The College of Science already possesses an experimental farm, workshops with machinery, the apparatus for physical and chemical instruction, geological and botanical museums (to the latter a small botanical garden is attached), and a drawing school. And any further requirements should be granted which Dr. Cooke may show to be necessary in order to render the course of instruction in agriculture thoroughly efficient. The University has already given some encouragement to agriculture, and it is hoped that in due time degrees in agriculture may be granted which have recently been instituted by the University of Edinburgh. As regards the teaching which is to lead up to the College of Science, a difficulty exists in some districts in inducing the sons of actual cultivators to take advantage of scientific education; but the difficulty is not insurmountable, for in one or two of the farms attached to the High Schools most of the work has been done by the sons of "Kunbis." The efforts in this direction must be continued and increased in order to make this agricultural teaching both useful and attractive to the sons of actual cultivators. With a view to develop the agricultural side of the High Schools, or of founding purely agricultural schools, committees of influential agriculturists and others should be formed by Collectors and Deputy Educational Inspectors, and the matter placed before them in a practical light. Also Government would be prepared to give their aid if local committees were willing to start agricutural classes as an experiment. The first experiment should be made at Ahmedabad where a large number of intelligent and prosperous land-owners are to be found. The above are the main lines upon which His Excellency in Council is at present prepared to take action; and the details should be worked out by the Director of Public Instruction in consultation with the Director of Agriculture and the Principal of the College of Science.

5. For the purpose of (2) art teaching this Presidency already possesses the Sir J. J. School of Art; and this institution should also be the centre of Government efforts in this branch of technical education. In his report No. 4929 of the 20th of November last, the Acting Director of Public Instruction proposed large additions to the cost of the school, including three new Professors of wood-engraving and lithography, of painting, and of sculpture. He also supported a scheme proposed by Mr. Griffiths in his memorandum of 17th April 1880 for revising certain branches of Indian art work. Mr. Griffiths says:—"For the teaching of these subjects (wood-carving, pottery, art metal work, embroidery, enamelling) which are truly Indian in their treatment the plan which presents itself to my mind as being the most effectual in resuscitating and fostering the artistic processes which are now on the wane, is to procure the best native workman in his own special branch, giving him an atelier attached to the School of Art, fitted up in accordance with his special requirements. He should be paid a salary in addition to profits on sale proceeds for teaching a certain number of students who show an aptitude for his special craft. A sum should be allotted to each atelier for stipends and contingent expenses. It should be stipulated that the work produced be intrinsically beautiful both as regards finish and design." Government are not at present in a position to sanction the proposed additional professorships; but something may be done at once in the direction of Mr. Griffiths' scheme, which appears to be an excellent and practical method of encouraging indigenous art. Mr. Griffiths should be requested to ascertain in which of the art industries above noted teachers can at present be obtained of special fitness for the purpose indicated; and he should, through the Director of Public Instruction, submit proposals for starting this experiment without delay in one or more of these industries for which all the circumstances seem most favourable. In connection with the School of Art, rules involving a maximum expenditure of Rs. 10,000 per annum have recently been sanctioned for the encouragement of elementary drawing. These rules (published in the *Government Gazette* of the 22nd July last by Notification No. 1112 of 17th idem) provide for payment by results in grant-in-aid schools; for annual grants to certificated school-masters and pupil-teachers who teach drawing in their schools; and for prizes and certificates to those who produce drawings of the required standard and who pass in all the prescribed subjects. By bringing before the eyes of the people all that is best in painting and

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sculpture from the lowest decoration to its highest pictorial forms, Government will best promote arts both useful and æsthetic. The downward filtration theory is a true theory as applied to arts and industrial pursuits. The School of Art should fulfil this mission for the Presidency as it has been undertaken for the United Kingdom by South Kensington. Here also the beginning must be unpretentious.

6. There remain (3) the mechanical industries. And with regard to this subject the first question which arises is, whether a Technological Institute should be established ? After mature consideration His Excellency in Council has come to the conclusion that the time has not yet come to undertake such an ambitious scheme, even if the condition of the finances admitted of the large expenditure required to pay the staff of teachers, who in the first instance would have to be invited from Europe. At present the main object for effort must be to make science pure and simple at our Colleges more perfect than it now is. As yet the number of persons of sufficient scientific acquirements to avail themselves of the highest teaching of a Technological Institute is very small : and it is clear that the most economical as well as the most effective way of giving them this training will be to assist them in attending the highly developed institutions of this class already existing in Europe. Thus, for example, a Bachelor of Science or a Licentiate of Civil Engineering of the University of Bombay, who already has a fair general though unapplied education in science, might be selected for a stipend with a view to more special instruction. He might first be sent to a cotton mill in Bombay to learn thoroughly its processes and necessities ; and he might then go to England or Germany to undergo a full course of instruction in the special technical branches consided essential to a man of his profession. He would there frequent a Technological Institute and visit manufacturing centres, more especially those where the same manufacturing industries are carried out as in this Presidency. On his return he would be available as a Teacher of Applied Science and would be valuable as an adviser to the managers of existing mills and to those desirous of starting fresh industries. In a similar way some of the mill-owners in Bombay might be induced to send to Europe a few of their practised native managers or foremen, after they had been trained here, to study their profession there technically at special schools. Assistance would be given to them by Government in carrying out such a project, from which great and lasting benefit would no doubt accrue to the mill industry.

7. Putting thus aside for the present the idea of a Technological Institute in this Presidency the question for immediate consideration is, what instruction should be provided in the city of Bombay with a view to raise the scale of existing industries and prepare the way for other useful developments ? It appears to His Excellency in Council that what is required is an institution located in the district where the mills are and near the railway workshops, and that in this institution instruction should be given in such sciences as are necessary for the practical requirements of the managers and foremen on the one hand, and of the skilled artisans and operatives on the other. The illustrations of the lectures should be derived from processes with which the audience are familiar. The curriculum for boys who attend regularly with a view to become managers and foremen will have to be gradually developed and the methods to be followed in this part of the institution will have to be strictly defined, and the pupils admitted to it should pledge themselves not to leave until they have finished the full course, unless they can show special reasons for abandoning the school. Admission should follow on evidence being given that the boys have enjoyed primary education. Whether the curriculum should be full-time or half-time will depend upon the disposition made by employers of labour. If they are determined not to accept boys under a certain age and to give preference to boys who have attended as full-timers, it will be possible to require a full-time attendance for a brief period and not half-time attendance for a longer period. Among the subjects suitable for instruction would be physics, practical mechanics, chemistry applied to arts, knowledge and sources of raw materials, nature of tools, dyeing and bleaching, drawing plans and designs, theory of colour and beauty, the manipulation of cotton, jute, wool and silk, their processes of manufacture and the art of finishing the same in woven fabrics, the construction and designs of steam and other engines. These subjects should not all be taught at starting but they may gradually be introduced. The object of such a school should be to give the students a grasp of scientific facts which they can readily apply to any trade. The reason why subjects should be taken in connection with surrounding industries is to attract pupils to the school and also to make visits to the mills profitable, and to get from the students teaching power for the artisans' evening classes, to which reference will presently be made. The object should not be lost sight of to make this institution a training school for managers and foremen of other industries as well as of those now in existence. The institution must not lose its disciplinary character or its adaptability to industries in general. Where special industries require special schools those interested should take steps to organise them with the help of local committees. The object of this institution will not be to put into the market the article of any industry but the workman fit to be employed in any industry.

8. For the skilled artisans and operatives there would be evening classes suited to their requirements. In order that the teaching may not be above their level it should begin very low, with reading and writing, arithmetic, geometry and drawing, and modelling in clay.

9. Such being the outline of the proposed institution the next point for consideration has reference to its constitution and management. And on this point His Excellency in Council is clearly of opinion that the balance of advantages is in favour of its being started as an aided institution, under the management of a competent and representative Committee or Board. By such as arrangement various difficulties of an administrative kind will be avoided ; and the institution will be more elastie, for the native community will be directly connected with the experiment, and it will be easier in an aided institution to make such charges as the course of events may show to be necessary, than if the regulations were framed by Government and required to be revised by the same authority. Accordingly the Committee of the Ripon Memorial Fund, which has already taken up his subject, should invited to co-operate in the scheme, and to undertake the establishment of this institution upon the assurance that it will receive from Government aid of a very substantial kind. For this purpose it is suggested that the Committee should form itself into and association for the promotion of technical education in the city of Bombay. This association would be recognized by Government, and would receive from Government the utmost possible aid on the principle enunciated in this Resolution.

10. His Excellency in Council would make it a condition that the Principal of the new institution should in the first instance be an English Technologist, and that Government should be represented on the Committee, which should be made thoroughly representative of all trades, industries, and handicrafts in the city. The managers of the mills, of the railway works, of the Dockyard, and of any other great works, as well as representatives of the smaller industries, such as carriage-building, watch-making, engraving, embroidering, toymaking, not to mention jewellers and gunsmiths, should be placed on the Committee, and divided into Sub-Committees for each branch of the institution. Government should be represented by Dr. T. Cooke, Mr. T. B. Kirkham, Mr. M. C. Murzban, Mr. K. D. Naigaumwalla, Mr. N. N. Wadia and by one or more of the science teachers in Bombay.

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11. As the first step towards the practical organisation of the institution, Dr. Cooke, who has much knowledge and experience in these matters, should be requested to place himself in communication with the existing committee and with their assistance to draw up a preliminary scheme, with courses of lectures in certain subjects, prizes and scholarships for the pupils who pass examinations in the subjects of the lectures, and rules for the selection and remuneration of the lecturers. The existing laboratories, collections, as well as Science Teachers in Government and Aided Colleges should be utilised for this purpose. Dr. Cooke should be asked to communicate with the various public bodies and societies in Bombay with a view to obtaining their co-operation and support. The Sassoon Mechanics Institute, the Mill Owners' Association, the Parell Mechanics Institute, the Students' Literary and Scientific Society, and other similar bodies will probably give assistance in furtherance of their own special objects. It may be hoped that the Municipality and the Railway Companies will contribute to make this scheme a success, and they should be duly represented on the Bombay Committee. The test of the success of the teaching will be whether the employers of labour appreciate its results, and whether the wage-earning classes avail themselves of these fresh opportunities.

12. It has been suggested that before the institution is formally opened an Industrial Exhibition should be held under the patronage of Government, when it is thought that the greater portion of the machinists and furnishers who supply the various mills and factories might be induced to send machines and other articles to the Exhibition with a view to eventually presenting the same to the institute. If the Principal is engaged at an early stage he could with his staff conduct the important work of managing the Exhibition, and this would give him time and opportunity to gain information and knowledge of the people, so that he would be in a better position to arrange his classes and select his pupils. This idea appears to be deserving of consideration.

13. In this new departure examinations will occupy a secondary position, because examinations are considered a corollary of good education, but no sure test of it. The success of the scheme will depend on good teaching rather than on multiplicity of examinations. They will be a sequel to the education provided and not overrule it.

14. As regards the wants of the Mofussil in respect of industrial training, the main dependence must be upon the High Schools for elementary science and upon such institutions as local efforts may start with the aid of Government. The Aided Colleges at Ahmedabad and at Karachi will in some respects be able to give powerful assistance to any movement which may contemplate a more widespread scientific education than these Colleges are intended to give. His Excellency in Council trusts that the opportunity which is given by the organisation of these Colleges and the new Madrassah established by the National Mahomedan Association at Karáchi, to assist the development of technical education, will not be lost, and in the selection of a Principal for the Sind College and eventually for the Ahmedabad College, the selection should be made of a teacher capable of dealing with this problem. There will be Boards of management for these institutions and the Government representatives on them will be instructed to carry out as far as possible the views of Government as stated here. Places which as yet have no High School, such as Hubli favourably situated for an independent technical school, might with advantage make a fresh departure and start an institution complete in itself and besides preparatory for the College of Science or the School of Art. All Government High Schools have for some years past been supplied with scientific apparatus for the teaching of elementary physics and chemistry to the senior pupils. His Excellency in Council is of opinion that this instruction has been useful so far as it extended, but that the time has now arrived for a thorough re-organization of the science instruction in High Schools with a view to secure the following objects :—(*a*) to make it both more thorough and more practical, (*b*) to secure a nucleus of real scientific work, sound as far as it goes in every High School, so as to discover the boys who have special aptitude in that direction and pass them on to the Science and Art Colleges. These objects Government consider can best be attained by the appointment of a competent instructor in science to the staff of every High School, by the allotment of a certain number of scholarships, the minimum being two, for proficiency in natural science, and by making it the duty of the science teacher to instruct the scholarship-holders and other pupils specially studying science, in the practical manipulation of the apparatus. The Director of Public Instruction should draw up rules to give effect to these principles, and the Educational Inspectors should be instructed, in reporting on High Schools, to devote a special paragraph in their reports to the state of the science instruction, the proficiency of the senior scholars and senior pupils studying science, and to the condition of the scientific apparatus. His Excellency in Council is also desirous that the scientific apparatus, which has been supplied at public cost, should under suitable conditions be made available for public instruction by means of popular lectures. The Director of Public Instruction should make arrangements for the offer of honoraria to competent science lecturers, whether teachers in Government service or otherwise, who are prepared with courses of lectures on scientific and agricultural subjects, and especially on such as have a practical bearing upon any art or industry carried on in the particular neighbourhood. The lecture-room and apparatus of the High School and the assistance of the science teacher of the High School should be placed at the disposal of the lecturer. A syllabus of the proposed course of lectures should in all cases be submitted for the previous approval of the Director of Public Instruction.

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15. With regard to the subject of drawing in High Schools the recent rules already referred to should be followed as far as they are applicable, but in addition His Excellency in Council directs that in every High School the Teacher of Drawing shall hold one class either in the morning or the evening, out of ordinary school-hours for the instruction of persons already engaged in arts or manufactures who may wish to improve themselves in drawing. In the absence of trial it is difficult to say what response may be expected on the part of the native artisan class, and Government would therefore wish that in the first instance the instruction to this class should be offered gratuitously. School-masters and teachers in adjacent schools should also be admitted to this class with a view that they may qualify themselves for teaching elementary drawing in their schools.

16. By means of these measures it is hoped that, without a formal bifurcation of studies in the High School, the modern side which has been prominent in this Presidency will be still further developed, so that all the advantages of bifurcation will be obtained without the attendant inconveniences and expense.

17. In primary education by selection of books referring to natural objects, to facts and principles of agriculture, by object lessons, by elementary wood-work and cardboard designs the pupils should have their constructive faculties developed. At the Training Colleges this factor of elementary teaching should be, as well as drawing, carefully kept in view by the Educational Department.

18. The subject of special industrial schools is not one which the Government are called upon to undertake. It is one for consideration of localities and trades. Their object is the improvement of the manipulative skill already existing by holding up for imitation and by encouraging a higher style of finish. Such schools would be of the greatest use to the sons of those handicraftsmen who carry on hereditarily special branches of manufacture. The co-operation of these guilds should be secured before starting such schools. At present there are two large schools of industry at Ratnagiri and Surat, besides one or two smaller ones elsewhere, which are working fairly well. There is also a Missionary Industrial School at Sirur, and another at Poona. These institutions afford instances of what can be done by local effort. When schools of this kind are regularly recognized as an important agency for professional as opposed to disciplinary technical training, it is hoped that native benefactors will provide funds to establish additional ones in other towns. The nature and scope of such schools should be fully explained to the public, and Municipalities and Local Boards should be encouraged to maintain them in accordance with the needs of local industries. Government aid will be granted as far as possible to this useful work. Ahmedabad might well be among the first places to distinguish itself in this direction. And in Poona metal-workers and silk-weavers might be taught at special institutions started by the Municipality or by local bodies. It appears to His Excellency in Council that local self-government affords the best means for local development of existing, and the revival of extinct or languishing industries.

19. In the new departure now being made in the matter of technical education, it is most important that Government should be in possession of detailed information regarding the methods followed in England; and with this view the Secretary of State has been asked to allow Mr. T. B. Kirkham, Educational Inspector, C. D., who is now on three months' privilege leave to remain on duty in England for three weeks after the expiry of the leave, for the purpose of making inquiries on the subject.

20. In concluding this brief review of the position as regards technical education, His Excellency in Council desires to express his satisfaction at the strong and healthy interest which has been taken in the subject by the public, as shown in the Press, as well as in the valuable suggestions brought forward by individuals who have made a study of the question. It is universally felt that new channels should be opened not to repress the intelligence of the country, so largely developed by means of the education imparted during the last 30 years, but to dissuade it from overstocking one field by providing other appropriate ground. Various gradations of technical education forming ends in themselves for various classes of the community must all tend to develop the material resources of the country, and to improve the general condition of the people. The public no doubt realize that financial pressure obliges the Government to be most careful in what they do, and that otherwise they would have been glad to extend the basis of operations as regards technical education. Being thus restricted financially His Excellency in Council would earnestly appeal to all local authorities and associations as well as to the influential and wealthy classes to come forward and co-operate heartily with Government in their efforts to enter the arena which several European countries have entered not so long ago achieving signal success in a very short time, countries which cannot be called rich but which realised the conditions imposed upon them by the keen competition which threatened their prosperity. His Excellency in Council wishes to make a cautious and small beginning; to establish a basis out of which gradually a more complete fabric may be developed by the process of natural evolution; to utilise existing resources; to labour in a few and selected fields; to work out the scheme almost entirely through native agency; to improve such native agency by giving them opportunities of completing their education in Europe and of witnessing the industrial, agricultural, mechanical, artistic and mercantile development of the western world. The scheme is not academic, does not include legal and medical education because it is not intended for the academic but for the producing classes. Its success cannot be tested by examinations, but rather by exhibitions and by statistics of imports and exports, prices, and wages. Its main object is to enhance the well-being of the people at large by giving increased employment in the Presidency to labour and capital, and by cementing the harmonious relations which should exist between both.

W. WEDDERBURN,
*Acting Chief Secretary to Government.*

# NORTH-WESTERN PROVINCES AND OUDH.

## *No. 11.—Resolution on Technical Education.*

No. 1286 E., dated the 23rd September 1890.

From—The Secretary to Government, North-Western Provinces and Oudh,

To—The Secretary to the Government of India, Home Department (Education).

**No. 11. Technical Education in the N.-W. P. & OUDH, 1890.**

WITH reference to Home Department letter No. $\frac{7}{213}$, dated the 23rd July 1886, I am directed to submit, for the information of His Excellency the Governor-General in Council, a copy of a Resolution and of its annexure, being a Minute, dated the 8th September 1890, recorded by the Lieutenant-Governor and Chief Commissioner on the subject of the development of a scheme for imparting technical education in the North-Western Provinces and Oudh.

No. $\frac{\text{1267 E.}}{\text{III—90-39}}$ OF 1890.

RESOLUTION.

EDUCATIONAL DEPARTMENT.

*Dated the 17th September 1890.*

OBSERVATIONS.—The papers read in the preamble relate to the subject of technical Education in India, to the extent to which facilities for obtaining technical instruction at present exist in the Province, and to the possibility of further developing them. The points reached by the inquiry so far as it has been made by this Government, the points which have still to be ascertained, the direction which technical education in these Provinces should take, and the limits within which it must necessarily for the present be confined, are indicated in the Minute of the Lieutenant-Governor and Chief Commissioner, which is published herewith for information. To consider how far the views put forward in that Minute meet the industrial needs of the Province, the Lieutenant-Governor and Chief Commissioner has decided to appoint a Committee composed of Mr. T. H. Wickes, Joint-Secretary to Government in the Public Works Department: the Hon'ble E. White, Director of Public Instruction; Mr. T. W. Holderness, Director of Land Records and Agriculture; and Mr. Izat, Manager of the Bengal and North-Western railway, who has kindly consented to serve on the Committee so far as his own occupations will permit him. A native gentleman will also be added to the Committee. The Committee will obtain from all available quarters full information on each of the points indicated in paragraphs 28 to 36 of the Minute, deputing for this purpose one or more of its members for the purpose of this inquiry to Calcutta, Bombay and Madras, and will report to Government the result of its inquiries, with its own recommendations, and with a full and detailed statement of any scheme which it may desire to see carried into effect.

ORDER.—Ordered that this Resolution be published in the *North-Western-Provinces and Oudh Government Gazette*: that a copy be forwarded to each Member of the Committee for information and guidance: also that a copy be forwarded to the Government of India, Home Department, for information, with reference to Home Department letter No. $\frac{7}{213}$, dated Simla, the 23rd July 1886.

## *No. 1 (a)—Sir A. Colvin's Minute on Technical Education.*

The question of Technical Education has been lying by for consideration since I took charge of this office. I have abstained from dealing with it hitherto, partly because more pressing affairs engaged my attention, and partly because the question has been meanwhile under discussion in other Provinces where there were in some respects greater facilities existing for its solution; and I judged it expedient to wait and see what form the decision took elsewhere, before deciding what should be done here. A considerable amount of material has thus been collected. We have before us the experience of Madras, Bombay, and of Bengal. We have also papers on cognate subjects,

such as the establishment of a practical alternative Entrance Examination by the Allahabad University; the proposals for the establishment of a Faculty of Engineering in the Allahabad University ; the establishment of a Jubilee School of Arts and Industry at Lucknow; and the question of an Industrial Survey. This latter question I have discussed separately with Mr. Holderness, and it need not at present be taken into consideration further. The decision I have arrived at is that in this direction no further information is required than has been collected up to the present time in these Provinces. The matter has for some time past occupied the attention of this Government, which has before it full accounts of all the industries practised within its limits. The steps taken in pursuance of the Resolution of the Government of India, No. 239, dated 14th March 1883, will be found in the Revenue Proceedings of the North-Western Provinces and Oudh Government for February 1884, and in subsequent papers. The conclusions embodied in this Minute will show that there seems to me no primary connection between further action in connection with an Industrial Survey and the present development of such technical training as in these Provinces will prove most immediately useful. It may be, however, possible to establish at Lucknow, in connection, perhaps, with the Arts Museum at that place, and with the aid of funds which have been voted by the Tálukdárs, a technical school having for its object the improvement of the *technique* of one or more of the handicrafts practised in these Provinces; but I think it is desirable to treat that part of the question as subsidiary to inquiry and the formation of a final opinion on the particular branch of the subject dealt with in this Minute.

2. Before explaining what this branch is, and why I propose to single it out to be first dealt with, it will be useful to summarize the information now lying before me, and to show what, up to the present time, has been the course of matters in these Provinces, and what, as far as we are informed, has been done in Madras, Bombay, and Bengal.

3. The Government of India in its letter of the 16th September 1885 first opened this subject by forwarding for the consideration of this Government a copy of certain papers from Madras (Madras G. O. No. 377, dated 3rd June 1885, and enclosures) regarding a scheme then recently approved by the Madras Government for the development of scientific and technical instruction in that Presidency. The paper was referred, demi-officially, by my predecessor to the Director of Public Instruction, with a request that he would review the state of the matter in the North-Western Provinces. Briefly stated, the Madras scheme aims at promoting technical education in industrial arts and manufactures, by offering grants-in-aid to encourage the teaching, in schools so aided, of technical science, arts and handicrafts, and by testing that teaching by a system of public examinations. The immediate object of the scheme is to open up some other employment than public service for educated persons of country birth. A School of Arts, an Agricultural and an Engineering College exist already at Madras, where technical instruction of the above kind can be imparted; but the aim of the scheme embodied in the papers forwarded was further to create and encourage technical instruction in Middle Class schools.

4. On the 23rd July 1886 the Secretary to the Government of India in the Home Department forwarded a "Note" drawn up in that Department on the subject of technical education in India, adding that the Government of India wished to learn whether the suggestions made therein met with the concurrence of this Government, and if so, what steps, having due regard to financial considerations, the Lieutenant-Governor would propose to take, in order to give effect thereto. In paragraphs 24 *seq.* and *seq.* 49 of the Note were summed up the facilities now existing in these Provinces for technical training: the conclusion drawn being that "on the whole it may be said that there is room for improvement in all branches of technical training in the North-Western Provinces and Oudh." The Note was forwarded to the Director of Public Instruction, the Director of Land Records and Agriculture, the Inspector-General of Civil Hospitals, and the Secretary to Government in the Public Works Department; and the opinions of the two latter were invited especially in connection with the Agra Medical School and the Roorkee College, after consulting any officers whose opinion they might consider of any value.

5. The Director of Public Instruction replied on the 9th January 1888 to the above letter. He pointed out that the question of establishing faculties of Medicine and Engineering was under consideration in the Allahabad University, which was also considering the preparatory course of study to be required from students desiring to matriculate, and the course for degrees in the faculties of Law and Arts. He added that the application of the sum subscribed in Oudh for the establishment of an institute for technical education (an incident which has been mentioned in the first paragraph, and will be referred to later in the course of this Minute) had brought the question in these Provinces to a practical issue. He had written to the Superintendent of the Arts School at Lahore for information regarding the expenditure connected with that school. He proposed that the question of agricultural and veterinary schools should be referred to the Department of Land Records and Agriculture, as also the teaching of land surveying. With regard to the instruction of drawing in Government and aided schools, he promised a separate report: "But I would note here," he added, "that nothing can be done until drawing masters can be entertained to teach the pupil teachers at the Normal schools." The suggestion that instruction in introductory science should be made a compulsory part of the secondary school course was one, he considered, which must be left to be decided after the University Entrance Standard had been fixed and could be best determined by the University itself. He briefly referred to other points brought forward in the note sent by the Government of India, and summed up his recommendations.

6. Colonel Forbes replied on the 15th January 1888, with regard to the question referred to him concerning instruction in Engineering. He considered that the practical instruction gained by natives at the large railway workshops at Allahabad, Lucknow and Lahore, and at the Government Workshops at Roorkee, is now bearing fruit at Delhi, where there are at present 17 foundries and mechanical shops: one with a 20 horse-power engine worked entirely by natives, without European supervision; at Roorkee, where there is a small foundry and shop under Native management; at Meerut, where there are two native foundries and shops, and at other places. The headmen of these shops, he wrote, and a good proportion of the workmen, received their training in the railway or Government workshops, which may, therefore, be considered the real technical schools where these men were educated in the practical working of their art. He thought it, therefore,

unnecessary for the Government in these Provinces to start schools for technical Engineering. Facilities might be given, he concluded, by Government to a limited number of selected students of the Middle or High schools, to go through a four or five years' course of practical work at a railway or Government workshop, but beyond this he would not go. He forwarded the opinion of Colonel Brandreth, the Principal of the Thomason College, and of the late Colonel Ward, Chief Engineer to this Government. The former wrote that he was unfavourable to any school for technical education for the youthful masses, but would provide special opportunities for exceptional young men, though such opportunities need only be very limited in number. "For the higher grades of Engineering, I think the ordinary liberal education with a scientific learning is most suited, until a man is of an age to know his mind, and elect for the profession, when there should be a strictly technical education for a limited time: two or three years, followed by a careful apprenticeship on works." Colonel Ward contended that facilities should be given at the Roorkee College for practical instruction, in addition to the present theoretical course. If such a technical practical class were formed at Roorkee, students from the schools might be allowed to attend it without going through the College theoretical course. He thought, therefore, it would be a great advantage to the young men of these Provinces to divide and treat the Middle and High schools as suggested in paragraphs 85 to 88 of the Government Note.

7. The Director of Land Records and Agriculture forwarded his opinion on the 16th January 1888. He pointed out that surveying and mensuration are largely taught in the schools under the Educational Department; and that we have also in every district in these Provinces a school of practical surveying, primarily for the instruction of patwaris and patwaris' sons, but open to all classes. He advocated the creation of a Normal school for survey only, at Cawnpore or Lucknow. He also pointed out that lads were trained in horticulture at the Saharanpur and Lucknow Gardens, and that the supply was unequal to the demand; at the Cawnpore Farm also a few apprentices are in training, several of whom had subsequently found good places, their services being much appreciated. He advocated small scholarships for the maintenance of boys in training at the various workshops in the Provinces; the establishment of an Art School at Lucknow; of agricultural and veterinary schools or classes in High schools; he proposed that drawing should be made compulsory: competency to teach drawing being prescribed as an essential qualification in all teachers in Middle and High class schools.

8. Dr. Rice, the Inspector-General of Civil Hospitals, also reported on the 19th January 1888, disapproving the proposal to teach up to a higher standard than that of the Hospital Assistant class in these Provinces. One or two Assistant Surgeons yearly, he wrote, meet all our wants in this direction; who can be educated as at present at Lahore, where we sent five students yearly, two of them receiving stipends from the North-West Government.

9. On the 19th March 1888 the Director of Public Instruction again reported, expressing an opinion adverse to the establishment of a School of Art at Lucknow: and on the same date he submitted a further report regarding the introduction of drawing into public schools, of which, briefly, the burden was that, however desirable the proposal, there were no funds; but that if funds could be provided for introducing drawing into the zilla and public elementary schools he would prepare a scheme.

10. On the 11th December 1888 the Director of Public Instruction forwarded a Resolution of the Senate of the University of Allahabad: practically to the effect that at present any steps to establish a College for training medical practitioners would be premature.

11. On the 15th February 1889 he forwarded copy of a Minute by the Senate, of the 14th January 1889, in which it was decided to take steps to establish a Faculty of Engineering. Colonel Forbes, whose proposals were adopted by the Senate, proposed that the University should confer a degree on men who had passed at least a three years' theoretical course at a properly constituted Engineering College or School.

12. A note by Saiad Muhammad Husain, M.R.A.C., Fellow and Member of the Faculty of Arts of the Allahabad University, is also among the printed papers. The conclusion he seems to have come to is that the demand for men trained in mechanical arts must be created before the supply and that at present the demand does not exist.

13. The Registrar of the Allahabad University, on the 30th November 1889, forwarded to the Public Works Department a letter from the Educational Department of this Government (written with reference to the Senate's proposal for the establishment of a Faculty of Engineering at the Allahabad University), enquiring what facilities are already in existence in the provinces for studying the subject for which a Engineering degree would be conferred, and what facilities would be likely to be called into existence should such a faculty be established.

14. This file is still under the consideration of the Public Works Department, which is engaged in obtaining the information required, but has not as yet replied to the Registrar's letter. It is, therefore, premature to include in this Minute any final information on the subject: but so far as can be gathered from the papers before me, the only place at which Engineering can be studied in these Provinces is Roorkee; and if a Faculty of Engineering be established no facilities would be provided for studying Engineering which are not provided at the cost of Government: so that Roorkee would supply all the candidates likely to present themselves. The Public Works Department is, as at present informed, I believe, of opinion that if degrees are conferred by the Allahabad University the Roorkee certificates for Roorkee students should be abolished; but it prefers Roorkee certificates. Pending the consideration of this matter by the Government of these Provinces, the Resolution of the Senate regarding the establishment of an Engineering Faculty has not been forwarded to the Government of India.

15. The establishment of what has been described as "a special examination of a commercial and practical character" by the University is also under consideration. This belongs to the class of what may be called general measures for the furtherance of technical education, rather than to the immediate practical section of the inquiry. It aims at giving a preliminary instruction, without which no large growth of technical education can be hoped for: but it is a measure of which the effect can be felt only after the lapse of a considerable time, and the disposal of the immediate section of

the question under consideration need not await final decision on this point. All that we have to be careful about now is that any measures that we may decide upon should be in conformity with the alternative standard scheme; and capable of such expansion as may harmonize with the principles likely to be embodied in any decision which is ultimately come to.

16. It is unnecessary, in view of the above remarks, to enter at any length into the present state of the special University examination question. It will be sufficient to state that the Government of India, in the Home Department, on the 18th September 1888, addressed this Government regarding the recommendation of the Education Commission, that in the upper classes of High schools there should be two divisions, one leading to the entrance examination of the Universities; the other of a more practical character, intended to fit youths for commercial or other non-literary pursuits. The Government of India considered that no method could be wholly satisfactory, under the existing circumstances, if the University does not co-operate by establishing the alternative examination suggested by the Education Commission, and thus enforce that bifurcation of studies to the adoption of which the Government of India attaches the greatest importance. This Government was, therefore, asked for its views as to the best method of establishing an alternative standard for the University Entrance Examination. It was not contemplated that the present arts standard of entrance examination should be altered, but that another and an alternative standard should be established. The question having been referred to the University, the Registrar forwarded to this Government, in November last, a scheme which the Syndicate, after consulting the Faculty of Arts, were prepared to recommend to the Senate at the University annual meeting on the 30th January 1890, which would, if carried, meet with the wishes of this Government. This Government addressed the Government of India, forwarding the scheme submitted by the Registrar with its own remarks. The Government of India has lately replied, and their letter has been sent to the University for consideration.

17. The above *resumé* disposes of the hitherto correspondence directly connected with technical education, and brings out what may be considered the preliminary points which must be dealt with before the subject is more intimately approached. We find that a considerable number of the suggestions of the Government of India are either not thought desirable in these Provinces, such as the organization of a School of Arts; or, like Veterinary and Higher Medical schools, are not urgently needed in view of the facilities given in neighbouring Provinces; or have already practically been put into effect: such as in the case of the teaching provided by the School of Forestry, or the survey instruction given at the patwari school. We find the railway and other workshops giving practical education to a large number of artisans: and we thus get nearer to the heart of the subject by narrowing the points on which instruction seems to be required. There is seen to exist much difference of opinion as to the course which should be followed in these Provinces; but, on the whole, opinion points to the expediency, in the opinion of those consulted, of giving greater facilities for obtaining instruction in the subordinate grades of practical Engineering, and in the handicraft of the artisan.

18. We thus approach the aspect of the question which more immediately presents itself, namely, the measures to be adopted (subordinate to any larger scheme for developing further technical education in these Provinces, such as that of a special University examination, and bifurcation of studies in the Zila or Middle class schools). Before, however, dealing with this subject, the offer of the British Indian Association to establish a Jubilee School of Industry at Lucknow must be recorded. In July 1887 the British Indian Association, through its President, forwarded to the Government a Resolution of a meeting of the Committee of that Association, held on the 14th February 1887, to the following effect: "That a School of Industry be established and maintained at a cost to the Association of Rs. 500 per month; that one of the Wingfield Munzil building be set aside for the proposed school; that it be called the Jubilee School of Industry, to commemorate the auspicious Jubilee of the fiftieth year of the reign of Her Imperial Majesty; that the Commissioner of Lucknow be requested to obtain from the Government and the Local Municipal Board contributions towards so great and useful an object; that the management and control of the School of Industry, when opened, be vested in a Committee of the Talukdars to be appointed for the purpose; that with the permanent monthly grant made by the British Indian Association of Rs. 500, and of one of the Wingfield Munzil building roughly valued at a lakh of rupees, subsequently supplemented by equally liberal contributions by the Government and the Local Municipal Board, the School of Industry will make a fair start, and that it is also expected to receive liberal support from the princes and nobles in different parts of the country, and such of the Jubilee scholarships as may be available." The Government assured the Association of its sympathy and support, and asked them to nominate a Committee for the consideration of the subject and to draw up a working scheme.

19. I find next a collection of papers on the establishment of the proposed technical school at Lucknow, which was forwarded to this Government by the Director of Public Instruction on the 30th April 1888, which has, apparently, remained without orders. It contains the Resolution above quoted and the reply of this Government. The proceedings of a meeting held on the 6th August 1887 follow, the result of which was the formation of a General Committee; next are the proceedings of the 3rd October 1887, the most important feature of which was the announcement by Munshi Imtiaz Ali that in addition to the subscription of Rs. 500 a month by the British Indian Association, and the grant of the Wingfield Munzil building, individual subscriptions had been offered; and a list of these is then given, amounting annually to Rs. 17,440. The next paper is an abstract of a speech of Sir A. Lyall regarding the technical school, delivered at Lucknow on 5th November 1887, in which he merely refers to his pleasure at finding the question of a technical school adequately taken up by the Talukdars. There follows an extract from the address presented to him on the 7th November, in which a detail of the subscriptions is again given, with an expression of the hope that they will suffice at the outset to work out the proposed scheme for a technical school, "on the successful accomplishment of which the material prosperity and intellectual, moral and social progress of our country depend, and from which great advantages will doubtless result both to the Government and the people." It was hoped that further liberal support would be received both from the Government and from private individuals. The scheme was finally referred to by

Sir A. Lyall, at the opening ceremony of the Allahabad University, on the 15th November 1887, in which he said that their liberality and public spirit deserve all possible recognition and aid by the University, but that their whole scheme must be carefully worked out before it could be seen whether the school could be organized in connection with the University.

20. The final paper in the collection is a letter from the British Indian Association to the Commissioner of Lucknow, dated 15th December 1887, forwarding proposed rules regarding the constitution and management of the Association for the encouragement of technical education, and the establishment of a school of Arts and Industries at Lucknow. The rules merely concern the conduct of business by the Committee, and have nothing to do with the actual furtherance of technical education.

21. Before taking into final consideration the steps to be adopted in order to develop the technical education at present existing in these Provinces, I requested the Bombay and Bengal Governments to forward to me any papers showing the form which the scheme had taken there, and they kindly sent me a valuable collection. The Resolution of the Bombay Government of the 15th September 1886 explains the material existing to their hand in Bombay, and the methods adopted by the Government to work it into shape. It is not necessary that I should recapitulate its contents.

22. The report of the Victoria Jubilee Technical Institute of Bombay, from its commencement to the 10th April 1889, has also been forwarded to me by the Bombay Government.

23. The Bengal Government have forwarded a selection of papers on technical education in Bengal; and (what seems to have been the chief outcome of discussion on the matter in that Province), the Proceedings of that Government in regard to maintaining the Seebpore Workshops on a smaller scale. In the latter collection of papers is a valuable letter, dated the 20th February 1889, from the Director of Public Instruction (Sir Alfred Croft), to the Bengal Government, reviewing the Report of a Committee which had enquired into the question, and embodying his own conclusions. Paragraphs 16, 21, 22 and 23 of that letter are appended to this Minute.

24. From a study of the above papers, and from consideration of the subjects, in all its aspects, it is clear that before we attempt to give form to any scheme for extending technical education in these Provinces, we must answer to ourselves the definite question as to what, in these Provinces, we propose to understand by technical education. What is understood by technical education now-a-days in Europe may be best illustrated by Mr. Scott Russell's words embodied in the 2nd paragraph of the Bombay Resolution of the 15th September 1886, *viz.*: "It is necessary that each individual shall, in his own special profession, trade or calling, know more thoroughly its fundamental principles, wield more adroitly its special weapons, be able to apply more skilfully its refined artifices, and to achieve more quickly and economically the aim of his life, whether it be commerce, manufactures, public works, agriculture, navigation or architecture." It is also formulated in Mr. Kirkham's Report, dated 8th February 1887, to the Bombay Government: "The general principles that the real technical school is the actual workshop—that actual workshops are only called into existence by capital operating in accordance with its own law—that this training, so far as it can be given in schools or colleges, must be, in the main, preparatory and disciplinary, and that the improvement of science teaching all round and the spread of a practical knowledge of drawing are the indispensable preliminaries to any form of practical training—these and the other similar principles enunciated or suggested in the Resolution of Government may be considered as fundamental data accepted with practical unanimity by the authorities on the subject in England." Mr. Kirkham admits that "on both sides of the line of practical action there is every degree of diversity of opinion." The aim of the Bombay Government has been to supply practical instruction in the city of Bombay with a view to raising the standard of existing industries and of preparing the way for other useful developments. Raising the standard of existing industries being the aim, the question arises—What are the chief existing industries in Bombay? Cotton mills and railway engineering, is the reply. What is required, therefore, it is said, is an institution located in the district where the mills are, and near the railway workshops, and that in this institution instruction should be given in such sciences as are necessary for the practical requirements of the managers and foremen on the one hand, and of the skilled artisans and mechanics on the other. The scheme ultimately adopted is probably far beyond anything that we can accomplish in these Provinces, but I quote the views of the Bombay Government as illustrative of the lines in which they propose to work, which seem to me to be identical with those which we should also adopt in these Provinces. We have a variety of arts and handicrafts in existence, which have existed from time immemorial; many of these have of late years, owing to demand in the market in Europe, and to the individual efforts of officers in these Provinces, received great encouragement. The aim of the schools of arts has been, among other matters, to assist in the improvement of these industries. On the one hand, however, experience has shown that our efforts, so far, to improve these arts and industries have not been so successful as to encourage us to devote any considerable funds to further attempts in the same direction, carried out on the same lines; while, on the other hand, the extension and growth of our rule in India has led to the introduction of certain industries which are not (like those of which I have spoken) what may be called caste industries, but industries owing their existence in this country to the introduction of British rule. These industries are, therefore, not taught by father to son, nor are they the property of guilds such as are the industries of carpentering and weaving, and so on in India: but they are nevertheless likely to take a great extension and to provide employment for an annually increasing number of artisans. It is, therefore, peculiarly the interest of the English Government to provide for the instruction of those who desire to be engaged in these industries, and to create every facility for increasing the number of those who may so desire. It is from this point of view that I have approached the consideration of the measures now to be adopted.

25. In Bengal Sir Alfred Croft wrote :—

"The abolition of the workshops at Seebpore is, in fact, a proposal which I view with the gravest misgiving. It is not altogether free from objection even as regards the engineer and overseer classes. Mr. Spring has pointed out that the theory of the steam-engine, for example, should go hand in hand with practical instruction, and that

No. 11 (a), N.-W. P. & OUDH, Sir A. Colvin's Minute, 1900.

the principles of the utilization of heat, of which engineer students have been found to have an imperfect grasp, should be regularly illustrated by tests and experiments on engines actually at work in the shops. Again, he remarks that the art of making neat and rapid free-hand sketches is an essential acquisition for every engineer and mechanic, and that the shops at Seebpore offer ready facilities for acquiring it. Still, these are details. The important point is that at some stage of their course engineer students should learn the use of their hands; and this point is secured by the proposals of the Committee. I may again be permitted to quote Mr. Spring as to the importance of such training to an engineer. 'There can be no question,' he writes, 'as to the superiority for Public Works employment of the men who have gone through the course of manual training. There are many reasons for this undoubted superiority; some of them are practical and others moral. An engineer who has learned to use his hands is, other things being equal, an all round better and more useful man than one who has not. The average young Englishman of the present day, especially if he has *con amore* adopted engineering as his profession, has, since his childhood, been in the habit of more or less using his hands. If he has no more than driven nails, whittled sticks with his pen-knife, and tinkered up a dog kennel out of old planks, he is to that extent more handy than ninety-nine out of a hundred Indian-bred boys, European or native, who would never dream of so far demeaning themselves, as they would consider it. We have now found out, as the result of eight years' experience, that Indian boys of every race and of every caste will use their hands and work at the lathe and at the bench alongside of artisans, for the sake of the possible chance of the very valuable prize of a permanent appointment in the engineer grades of the Public Works Department.'

"There is no ground therefore for taking exception to the Committee's scheme so far as it relates to the training of engineers. It is with respect to the needs of the mechanic class that I find the proposal to remove the workshops most open to objection. This is the department of the College to which Mr. Spring at any rate attached the greatest importance. I quote the following extract from various notes which he has written on the Seebpore College:—'The students are passed through a five-year course of technical training, in which a sufficient knowledge of theory, drawing and surveying is combined with a very good practical knowledge of workshop methods and practice in the use of hand and machine tools. Ex-students of this class almost invariably succeed in obtaining remunerative employment, and complaints are frequently heard of the difficulty of obtaining their service—at all events in the Public Works Department. They are a thoroughly well trained and useful class.' Again—'The second, or mechanical overseer class, is a most popular and successful class. Large as this class at present is numerically (about 80, I believe, in average years), it is important that it should even be larger. There is an annually increasing demand in India for men competent to take charge of engines and machinery. The owners of the jute mills are, I believe, generally unaware that this class of superior artisan is systematically trained at Seebpore. The majority of the passed apprentices of the College find employment on the numerous inland river steamers and in charge of portable engines.' And again—'I would even go so far as to say that, in view of the possible great future of Seebpore as a technical school for the training of artisans and foremen, it would, in my opinion, be a wise move to, after a while, cut *the College adrift altogether* from its engineering class, so as to allow of the higher professional staff devoting all their energies to what I look upon as by far the most important, as it has hitherto, in spite of many disabilities, been the most successful class, that, namely, for the training of foremen......There is ample scope for the employment all over India of very large numbers of this most excellent class......They at present obtain employment as fast as the College can turn them out, and for want of more of them we are compelled, in the practical departments of the public services, to frequently employ all manner of half-trained loafers. Good men of this class, who have had four or five years' practice, can always command from R100 to R200 a month. There is ample scope for their employment in tea gardens, on river steamers, in mills, in workshops, on our public civil works, with contractors and with building firms; in the Survey and Telegraph Departments; in hundreds on our railways; in the Agricultural and Court of Wards' Departments; on irrigation works, and generally wherever a trained intermediary is required between skilled labour and its employer.'

"The Department described in such terms is the one whose future success, if not its very existence, seems to me to be jeopardized by the proposals of the Committee. It may be freely admitted and taken as proved that the maintenence of the shops is undesirable from the point of view of the Public Works Department. But it is no less clear to me that the interests of that Department are in this matter antagonistic to those of technical education; and that the deliberations of the Committee have been chiefly governed by regard to the former. Indeed there is something obviously defective in the idea of a technical institution for the training of mechanics from which everything of the nature of manual instructions is excluded. We are brought back to the time when the Civil Engineering Department was a branch of the Presidency College; and all the efforts made in the past ten years to carry out the modern idea of technical instruction, in which theory and manual work are combined, will have been made in vain. The workshops being removed, there is no longer any reason why the Engineering College should remain at an inaccessible place like Seebpore; and consequently all the expenditure incurred on buildings has been money thrown away. I am fortified in these opinions by the authority of Mr. Spring, whose interest in and knowledge of the subject are too well known to make it necessary for me to apologize for quoting him frequently in opposition to the Committee's views. Mr. Spring writes:—'In view of the necessity, under the law, for mechanical foremen, who are likely to have charge of the engines of inland steamers, putting in a five-years' apprenticeship in workshops,

it is in my opinion essential that workshops in one form or another should be maintained in immediate proximity to the College. The subject is a difficult one; but in spite of its difficulty it must be properly taken in hand and settled upon some satisfactory basis, unless the Government of Bengal is prepared to entirely give up the principles ennunciated by them when the Seebpore College was first founded. The mechanical foreman students must be apprenticed to the superintendent of workshops of some description or other, and these workshops must be situated in close contiguity to the College. If it is settled that the final two years of the five shall be spent under proper supervision in great outside shops, there is no longer any real necessity for maintaining the Seebpore shops upon their present scale. They must, however, be *bonâ fide* shops where real work will be done.' In fact, the question for the Government to consider, in dealing with the removal of the workshops from Seebpore, is whether they will 'entirely give up the principles enunciated by them when the Seebpore College was first founded': that is to say, whether they will give up the combination of class-work with manual work, which was intended to make the workman a man of his head as well as a man of his hands. I am informed that in the East Indian Railway workshops and in the Port Commissioners' dockyard an apprentice is taught only the manual part of his trade, and is left to pick up his theoretical knowledge as best he can. I am aware that this practice is defended by many men of experience, and it is pointed out that the dockyard apprentices do somehow manage to acquire the learning needful for them, since they pass the examinations prescribed for marine engineers. Still, the almost unvarying testimony of modern authorities on technical education commends systematic instruction during the period of apprenticeship as the more excellent way; and that is the principle on which for ten years we have proceeded."

26. The Bengal Government wrote on Sir Alfred Croft's letter as follows:—

"The Lieutenant-Governor considers that the workshops, which are no longer required by the Public Works Department, and, as now conducted, are very expensive, cannot be maintained permanently on their present footing. They are, moreover, not fully adapted to the purpose of technical instruction. But their abolition involves the complete abandonment of the principle upon which the Seebpore College was founded, that theoretical and practical instruction should go hand-in-hand, a system which has worked well hitherto in regard to the overseer class, the largest and most successful in the College. This principle the Lieutenant-Governor is not willing to give up without being fully satisfied as to the possibility of providing an efficient substitute in the manner proposed by the Committee, by instituting a system of apprenticeship at public and private workshops; and even such a system would possibly require to be supplemented by the maintenance at the College of a small workshop or 'mechanical laboratory' such as to give the pupils, from the outset, some familiarity with the practical use of tools. It, moreover, appears that, as indicated by the Director of Public Instruction, the course proposed by the Committee is too long, especially in the case of mechanics, many of whom would be unable to spend four to seven years on their training. The Lieutenant-Governor accordingly proposes to reserve orders on the points specified in the ninth paragraph of this Resolution pending the issue of an inquiry ordered by the Government of India by way of a technical survey of existing industries in Bengal. The officer deputed for that purpose will be required to report how far apprenticeships can in fact be secured for passed students of the College on such terms as to ensure for them a practical training not inferior to that which they at present receive at Seebpore. Some enquiries on this point have already been made by the Public Works Department, but these will require to be supplemented by more exact information, and on receiving a complete report the Lieutenant-Governor will be able to decide finally on the course to be adopted."

27. Finally, the Government of India, concurring with Sir Alfred Croft and the Government of Bengal, wrote—

"In regard to the second question, I am to say that His Excellency in Council entirely concurs in the views of the Director of Public Instruction, Sir Alfred Croft, which it is understood also commend themselves to His Honor the Lieutenant-Governor, regarding the impolicy of abolishing the Seebpore workshops. Everywhere in India the promotion of technical education is now receiving attention, and the desirability of associating theoretical with practical training has been generally recognized.

"There exists in the Seebpore workshops the nucleus of a technical institution, the value of which would be seriously affected by disassociating the practical from the theoretical training of the College. The Governor General in Council doubts if any valid inference can be drawn from the state of the attendance rolls unfavourable to the prosecution of the experiment; and he attaches no great weight to the argument that hitherto the school has not been a financial success. He thinks the importance of the interests involved call for perseverance in the undertaking. and he would be glad if, with a view to improving the opportunities for practical instruction afforded by the school, it was arranged that some of the work of the Public Works Department should continue to be undertaken at the Seebpore workshops, and local boards and other bodies were encouraged to patronize the institution in a similar manner. I am to add that the Governor General in Council would further suggest for consideration whether scholarships, tenable at the Seebpore College, may not be established by district and municipal boards for the education of youths who might be placed under contract to serve afterwards for a certain period on district works. If, as appeared in the case of the Lady Dufferin Fund, there still be doubts as to the competency of district or municipal boards to establish such scholarships, the law should be so altered as to remove these doubts."

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28. I have discussed the subject with Mr. Wickes, Secretary to the Government in the Public Works Department, and Mr. Holderness, Director of Land Records and Agriculture, and I have undertaken to put down the conclusions at which our discussions seem to point as a basis for the further inquiries, in which both those gentlemen have promised to assist me. It is impossible, with our present knowledge, to formulate any scheme, and we were agreed that whatever was done at this stage, should be done with the view of obtaining competent criticism and advice on the outlines of our proposals. It seemed to us probable, after such inquiries as we have been able to make, that the railway, Roorkee, and other workshops provide sufficient training for the mere artisan, and that his training may be left to them. We agreed, I think, that what seems mostly needed at present, in these Provinces, in the matter of technical education, is the provision of greater facilities for a somewhat higher class of training in those new mechanical industries which have been introduced by British capital into these Provinces, and in regard to which, though there may be a growing demand for skilled labour, there is no indigenous source of supply. We are not, however, in a position at present to say what is the effective demand for men competent to deal with machinery, and familiar with at least the lower forms of engineering; and this is a point on which further inquiry is necessary. Assuming, however, such a demand to exist, the problem before us would be to decide—

(1) what direction such training should take;

(2) how best to secure it; and

(3) the sources from which the necessary funds could be obtained.

29. With regard to the first point: what would seem mostly to be required are facilities for gaining a competent theoretical and practical knowledge of the more subordinate grades of mechanical engineering, such as is necessary to a foreman mechanic, more specially in connection with the steam engine, the railway workshops, and the iron foundry; and also of the processes of cotton spinning as employed in the mills established in these Provinces. These are the two great branches of Industry which in Bombay have been recognized as fields for native labour; which, though in a lesser degree, exist here; and in regard to which, at present, specialized means of instruction are unquestionably, in these Provinces, wanting. With regard to the second point, there exists at Roorkee a Government Engineering College and Government Workshops, and it seems probable that we have here, subject to such further development as may be found necessary, the nucleus of the instruction necessary. The staff of the College, as at present existing, would possibly have to be enlarged, and a special class established for students seeking the special kind of technical instruction we should be desirous of giving; but the present course of the College, to a great extent, would be followed by all classes of students. The workshops might also require to have material added to them for such purposes of practical instruction as may be combined with theoretical instruction. Some small addition to the staff might also prove necessary. The Roorkee Workshops already instruct a certain number of apprentices every year, but these apprentices are of the class of artisans or simple mechanics, and not of the class of foreman mechanic for whom instruction in these Provinces may be found necessary if it be shown that there is a demand for such a class. The railway workshops similarly give training to a large number of the humbler class of mechanics, who bring with them, however, as a rule, no previous education whatever.

30. Prior to admission to such classes as we propose, it would be necessary to establish some such test as the anglo-vernacular middle class, to ensure some tolerable knowledge of English, and as a guarantee of the good faith of those who sought for instruction. A three or four years' course of instruction, theoretical and practical, would be required, which would possibly include a term of practical training in the railway workshops and the cotton mills. The proposal which seems to us at present most practicable is, that a certain number of scholarships should be given to be competed for by students desirous of entering the College, and that the holders of the scholarship should, by means of them, be enabled to pass through their course of instruction, whether at Roorkee or (as part of their course) in attendance at workshops or mills.

31. Two points, however, presented themselves, on which further information is necessary before any decision can be come to on the above project. In the first place, we wish to learn the opinion of railway authorities and of gentlemen who are employers or directors of mill hands, as to whether there is a field of employment for natives trained in the kind of theoretical and practical education we propose to give them: that is to say, as foremen mechanics, not as mere artisans; and, whether for the present the means of instruction for the ordinary artisan are sufficient; and, if not, what steps are possible, in view of the means at Government command, for improving that instruction. On that point Mr. Wickes and Mr. Holderness respectively have consulted railway and mill employers and directors, but the information they have obtained is as yet incomplete. We have, for example been assured by gentlemen competent to form an opinion that all which is required is the establishment of night schools for the elementary instruction in mechanics of the artisans at present employed in the railway and other workshops; and that there is no demand in these Provinces for native foremen mechanics.

32. Assuming that the class of instruction we propose is that which is most desirable, it will be necessary to learn whether the railway and mill employers are willing to allow students who are following the course indicated in this Minute, to go through a practical training at their several establishments, should that be considered necessary, and, if so, under what conditions and on what terms.

33. The question of funds is one into which it is at present, and until the dimensions of the scheme are decided will remain, premature to enter. It is probable that there would be some not inconsiderable initial outlay on the necessary additions to the plant at Roorkee Workshops, and possibly to the students' accommodation at Roorkee, as well as permanent charges for the tuitional staff and scholarships. It is premature further to follow this part of the question until we have satisfied ourselves that the bases on which we propose to build are practical.

No. 11 (b), Sir A. Croft on technical education, 1889.

34. The first point really needing solution is: are there grounds for believing that facilities for such instruction as will provide competent men of the class of foreman mechanic, are what are mainly required in these Provinces in order to meet a demand, and at the same time to furnish employment for natives desiring such means of livelihood? Secondly, if this is so, have we reason to believe that duly competent judges (employers of railway and mill labour, for example) approve the system of instruction sketched out in this Minute? Thirdly, what light can the Educational and Workshop authorities at Roorkee throw on the proposals put forward by us: that is to say, what material contribution can they bring towards the settlement of the special question connected with the class of education which it is proposed to give?

35. In order to obtain what information is available to us on the above points, I have decided to appoint a Committee composed of Mr. Wickes, Joint-Secretary to this Government in the Department Public Works; Mr. White, Director of Public Instruction; Mr. Holderness, Director of Land Records and Agriculture; and Mr. Izat, Manager of the Bengal and North-Western Railway, who has very kindly consented to assist the Committee, and to lend me, so far as they can be spared from his own duties, his services in the proposed inquiry. A native gentleman will be added to the Committee. I should wish the Committee to obtain from all available quarters full information on each of the above points; to depute one or more of its members, if it thinks necessary, to Calcutta, Bombay or Madras, in order to see what can be utilized by us in the experience gained by the working of the technical institutions at those several towns; and to submit to me, so soon as they are completed, the result of its inquiries, with its own recommendations, and a full and detailed statement of the scheme which it desires to see carried into effect.

36. I shall be glad if one or more members of the Committee would, more particularly while at Madras, where I understand that the subject has been especially studied, inform themselves of the measures taken there, and the progress made, in the direction of improving the *technique* of handicrafts, whether by teaching hand-drawing, or by the use of better tools, or by whatever other methods they may find to have been adopted. This part of the subject should be separately studied by Mr. Holderness, Mr. White, and the Native member of the Committee, with special reference to the Lucknow scheme referred to in this Minute, and a separate report should be submitted. The efficiency, so far as Madras or Bombay have been concerned the utility, the cost, and the applicability of such a scheme to arts and industries as existing in Oudh and the North-Western Provinces are points to which attention must be especially directed.

37. It may, finally, be desirable to publish this Minute in the *North-Western Provinces' Gazette* both to let the public know what is the present position of the matter in these Provinces, and in the hope of obtaining practical aid and suggestions from those who are competent to give them.

NAINI TAL; *The 8th September 1890.* A. COLVIN.

## *No. 11 (b).—Extract from Sir A. Croft's letter on technical education, dated the 20th February, 1889.*

16. In connection with the Seebpore College, the general question of technical instruction fall also to be considered. In my No. 571, dated the 26th January 1888, I observed that I regarded "the development of the Seebpore College to the highest attainable point of efficiency as the best, if not the only present, means of promoting technical instruction;" and I deferred the submission of detailed proposals on the subject until the report of the Committee should be received, on the ground that they must take their shape from the Committee's scheme. In giving an outline of what were then believed to be the Committee's proposals, I stated:— "In addition to the classes for engineers, civil overseers or clerks of works, and foreman mechanics, it has also been proposed to establish classes for land and estate management, for veterinary practice, for telegraphic employ, for account-keeping, and for the scientific and practical instruction of superior artisans." [A class for draughtsmen should have been added to the list.] "If these proposals are carried out, the Seebpore College will acquire much of the character of a central technological institute, except that it will not concern itself with the training of workmen or managers for special manufacturing industries." In reference to this programme it is important to notice that the maintenance of the shops at Seebpore was regarded by Mr. Spring as an essential part of the technical college which he hoped to see established there. "Let it be the aim," he wrote, "of the new Technical College at Seebpore to be a training school for foremen and leading hands, of a class fit to be employed, by the public departments and by firms, for the supervision of all operations involving for their proper prosecution a thorough knowledge of principles and practical methods. For the present it will be possible to train such men for the supervision of only a very limited number of operations. There will be ordinary workshop practice, such as carpentry, fitting, smithery, founding, machine erection, engine and machine tending. Next will come masonry, earthwork, girder-erecting, the handling of weights, the manipulation of ropes and chains, and such other branches of practical knowledge as go to make a good foreman of civil works. Next will come surveying in all its branches, including mensuration and estimating and drawing. Then will come telegraphy, sufficient for the practical needs of the inspector and signaller classes. The College ought to make the training of platelayers and railway overseers a *specialité*; it ought, for instance, to be possible to procure a man from Seebpore who could handle his gang of platelayers, and take out and put in a set of points and crossings, or replace a damaged rail on a bridge." He added that the training of all these classes of foremen should include, as it now does at Seebpore, a sufficient knowledge of theory, and a thorough knowledge of its application to work.

[N]o. 11 (b), Sir A. [C]roft on technical education, 1889.

All this, it will be observed, is confined to the technical training required for the supervision of labour, whether skilled or common. Other developments of technical instruction which Mr. Spring contemplated as part of the future Seebpore course were the following:—

Managers of states, land stewards, and tahsildars;

Accountants;

Draughtsmen;

Artisans.

* * * * * * * *

21. To get all the light that we can from the practice of other Provinces, I may observe that the Victoria Jubilee Technical Institute, lately opened at Bombay, is not a technological institute in the special sense just considered. The Managing Committee explain their programme in the following terms:—The Institute will at present give instruction in machine drawing, in steam, in mechanics, theoretical and applied, in physics, *i.e.*, electricity and magnetism, sound, light and heat. The machine-drawing classes are applicable to all the important industries of the district where machinery of any form is employed. Students will be taught to draw to scale the constructive details of various machines; when thoroughly conversant with these and the principles of theoretical and applied mechanics, in which instruction will be given, they will be able to design machines as occasion arises in daily practice. The principal features of the instruction, as now proposed to be given, are (with which end in view the laboratories have been so designed) to afford students facilities for the experimental study of the relations which the principles taught in the lecture-room bear to the problems met with in actual practice. . . As far as possible, pupils will handle the instruments and apparatus employed, and make experiments with them . . . At the end of this period (three years) a student with ordinary intelligence ought to be a fair mechanical engineer capable of taking charge of engines or machinery . . His qualifications can be tested practically in the workshops of the Institute. The Board has aimed to establish a systematic and enduring plan of classes in those science subjects which bear directly on the industrial occupations of the locality, as well as to provide a complete course of progressive study." The theoretical course covers much the same ground as that now prescribed for the apprentice class at the Seebpore College (which, it will be remembered, the Committee propose to reduce), except that the Bombay course omits surveying and pure mathematics, and carries the subjects of machine-drawing, steam and applied mechanics to a higher point. The initial qualification required is that of standard V of the Bombay Code, which includes English, History, Geography and Arithmetic, with no higher Mathematics. For admission to the apprentice class at Seebpore a student must have passed either standard VII of the European Code, or the University Entrance Examination in English and mathematics, or a special test comprising English, Arithmetic, Euclid and Algebra. It is clear therefore that the Bombay Jubilee Institute is comparable with, and is established on the same general lines as, the mechanic class at Seebpore. It is not a technological institute in the sense of giving instruction in the principles and processes of special arts or handicrafts: its object is, like that of the Seebpore College, to prepare pupils for general employment in mills and factories where machinery is used, though it is probable that Seebpore could borrow some useful hints from the course which the Institute prescribes,—for example, in machine-drawing.

22. To return, then, to the technical instruction of artisans in the first of the two senses specified in paragraph 20, namely, to take men already practising handicraft and to educate their hands and eyes in drawing, modelling, and the like, so as to make them more capable and skilful workmen. Mr. Spring expresses the requirements of such a class in the following words:—"Were our school situated in Bow Bazár, or at Muttiabruj, or near any other densely populated native centre and were we to open a class, not to teach artisans their own proper work, but to teach them subjects cognate to their work, such as would make them better workmen—elementary geometrical drawing, for example, for carpenters, a thoroughly good training in the principles of drawing for draughtsmen, and various novel methods such as would be obvious improvements on existing practice, to other craftsmen—we should, I have no doubt, gradually obtain a supply of willing and intelligent adult pupils. The very difficulty of even suggesting anything at the start which could be taught to such persons, *except* drawing, is an illustration of the need which exists for caution before putting money into such a branch of technical education. Improved methods of working must be taught, as a general rule, not directly in a school, but *through* the foremen who will be educated at our College"—that is, in the class for mechanics. And again:—"I have no faith whatever in any attempt to establish a class beginning with much more than this. The great workshops which are now dotted all over India are the real schools for the improvement of the artisans, and our Seebpore foremen ought to be, as it were, the under-masters in these schools, and will, by degrees, I hope, succeed in disseminating the improved ideas which we have taught them widely throughout India." And again:—"What I do believe in, as opposed to the idea of training up craftsmen fit to earn their living by the work of their hands, is the possibility of establishing classes at Seebpore as well as at factory centres, where the main fundamental principles underlying the successful practice of their craft can be taught to selected skilled workmen. Such a class must almost necessarily be a vernacular one. Beyond *drawing*, I would at first teach them little. The Educational Department have, if they care to avail themselves of the opportunity, ample scope, at the several great centres of labour, for the establishment of schools for the special teaching of our skilled workmen and of their children; and schools of this description, as well as the existing hill and other schools for railway employés' children, ought to lay themselves out, deliberately, judiciously and thoroughly, for working their best scholars up to the renovated foreman class at Seebpore."

23. These quotations will, I hope, help to clear our ideas as to the proper scope and limits of technical instruction. They lend support to the view that I have elsewhere advocated, that "the development of the Indian engineering colleges to the highest attainable point of efficiency is, for the present, the best and most practicable means of forwarding technical instruction." They involve

the retention of the mechanic class at Seebpore, *and of the shops* in which the apprentices can learn their work. They include also the establishment of drawing classes for operatives and their children at Seebpore and other factory centres and the affiliation of such classes, for the benefit of promising pupils, to the mechanic class at Seebpore. The first point, the re-organization of the Seebpore mechanic class, has been dealt with in the Committee's report and in the earlier paragraphs of this letter. With regard to the second point, I beg to refer to my No. 6660, dated the 26th December 1888, in which I have advocated the establishment of drawing classes at Calcutta, Hoogly and Dacca; primarily for the standard in drawing of the University Entrance Examination, but secondarily, I would hope, for the benefit of operatives in the neighbouring workshops and factories, for whom special classes should be formed. These proposals may do for a beginning; but if Mr. Spring's anticipations have any good ground, I hope to see them largely extended in future years. The projected industrial survey, as ordered by the Government of India, will show what local industries exist throughout the Province, in which of them increased skill is attainable, and by what means in each case the necessary improvement can be effected.

It may be mentioned that 46 high schools in Bombay have drawing classes attached to them containing 2,874 pupils; that from these classes 1,320 candidates appeared at the examination of 1887-88; and that 315 obtained certificates of the first and 11 of the second grade. It may be inferred that these classes would not be so popular unless they were found to be attended with some practical advantage.

## *No. 11 (c).—Minute by Sir A. Colvin on the Report of the Technical Education Commission.*

I HAVE read the Report of the Committee on Technical Education in the North-Western Provinces and Oudh, and I have had an opportunity of discussing it with Mr. Wickes and Mr. White. As a good many Departments will have to be consulted, and as time will elapse before final decision on several points can be come to, it is necessary to lose no time in putting into the way of disposal the decisions which at present seem desirable on the several points recommended by the Committee.

2. The recommendations of the Committee may be divided into two distinct classes: 1st those which it is possible to carry into effect with little or brief delay; and 2nd, those which are in great measure, necessary to the full carrying out of the first category, and partly independent: but which all admit of being postponed for more mature consideration.

3. The recommendations which fall into the first of these two classes are first, the re-organization of the Thomason Engineering College; secondly, the institution by the Education Department or by the University, of a school final examination for the modern classes of high schools; thirdly, the establishment of industrial schools at Roorkee, Lucknow or Allahabad.

4. The recommendations which fall under the second category are these: 1st, the establishment of a school of Art at Lucknow; 2nd, the establishment of an agricultural school at Cawnpore; 3rd the establishment of a teachers' central training college at Allahabad.

5. With regard to the first recommendation of the first category, namely, the re-organization of the Thomason Engineering College, this, again, is divided into two classes, namely, the recommendation which concerns the training for the ordinary Public Works Branch of Roads and Buildings; secondly, the recommendations which concerns the training for mechanical engineering.

6. In paragraph 36 are summed up the ten points in which proposals for modifying the present method of instruction in the Thomason College are recommended. These should be referred to the Public Works Department, in order that the opinion of Colonel Brown, Principal of the Thomason College, and any competent officers subordinate to him may be taken on each point, a copy of the report being placed at the disposal of that officer. If Colonel Brandreth is still in the country, I should wish a copy of the report forwarded to him also, with an intimation to the effect that, if he would do me the favor of recording his own views on the proposals of the Committee, I should be greatly obliged to him. On receipt of replies from Colonel Brown, and, should he favour me with his opinion, from Colonel Brandreth, the recommendations embodied in paragraph 36 will be considered in the Public Works Department.

7. The question of the proposed school final examination has already been, and now is, before the Government which has been in communication on the subject with the Government of India. Two proposals are, at the present moment, before the University, namely, an alternative entrance examination for students desirous of taking up what may be generally described as the subjects included in the B Course; secondly, a school final examination, which shall have no connection with the Entrance test, and which may or may not be conducted by the University. The Committee recommend, apparently, a school final examination in preference to the alternative entrance examination, to be carried out by the Education Department, and not by the University. As the matter is now under consideration by the University, it is necessary that a copy of the proposals of the Committee be forwarded, in continuation of previous correspondence, to that body, and that the Director of Public Instruction be asked to press upon them the desirability of a conclusion being come to, in order that it may be considered in connection with the decision to be taken on the Technical Committee's report. The suggestion that the examination, whether alternative Entrance or school final, be regarded as sufficient test for entry into Roorkee, makes it necessary that this question should be disposed of with as little delay as may be possible. Thirdly, the question of the establishment of industrial schools at Roorkee and at Lucknow or Allahabad, must also be considered in the Public Works Department, which should put itself

**No. 11 (c), N.-W. P. & OUDH, Committee on technical education, 1891.**

in communication with Major Brackenbury, the Manager of the Oudh and Rohilkhand Railway and any other Railway authority whom it may desire to consult, with a view of ascertaining the precise form which such schools should take, the places in which they should be located, and the possibility of obtaining from the railways qualified instructors. Both the proposal for the establishment of industrial schools and the re-organization of the Thomason Engineering College should be examined by the Public Works Department, in communication with the Director of Public Instruction, as the final proposals with regard to them cannot eventually be put before the Government without his assistance. It should be stated whether at present any industrial schools have been established by municipalities, charitable or religious societies, or private persons, to which grants-in-aid could be given as suggested in paragraph 42.

8. With regard to the establishment of a school of Art at Lucknow, in view both of the expense and the debateable value of the schools established in some provinces of India, no further step can at present be taken. The necessity, meanwhile, of obtaining qualified drawing masters for a certain number of selected zila schools, through which students desiring to qualify at Roorkee will pass, will become pressing. The Director of Public Instruction should examine the question from this point of view, and put before the Government his proposals as to the particular schools which he would select for drawing classes, and the mode of obtaining qualified drawing masters, pending arrangements for their teaching and supply from the Province itself. In this connection the establishment of a central training college, which should include a section for training masters in drawing, may be further considered. The Director of Public Instruction has already completed and put in force measures for constituting and consolidating the normal schools in which teachers are trained for Vernacular instruction. What has now to be considered is the establishment of a similar normal school for teachers in the Anglo-Vernacular classes. Here, again, time must elapse before any proposals can take definite shape or be finally approved, and when they have been approved more time again must pass before any results can be obtained. It will be necessary, therefore, that the Director of Public Instruction should mature his proposals for obtaining the supervision and direction by a competent superior of the drawing masters who may be employed in the zila schools, as above mentioned, and of such instruction in drawing as may be given in the industrial schools.

9. Similarly, until instructors are forthcoming to teach so much of the physical sciences or of chemistry as may be necessary for lads in the zila schools electing to pass into Roorkee, the Director of Public Instruction must consider and put forward proposals for tuition in these subjects in selected zila schools, presumably those in which drawing will be taught; for the appointment of teachers qualified to give instruction up to the required standard; and for obtaining any necessary apparatus. Hereafter the supply of these teachers will presumably come from the central normal training school, but that, again, will not, probably, for some years, be in a position to turn out qualified men; meanwhile the best intermediate measures must be adopted which may be possible.

10. In paragraph 12 it is proposed that the Reformatory Schools in the Province be placed under the control of the Education Department, as in Madras. These schools are elementary, and are at present three in number, one in the General Reformatory at Bareilly, one in the Sánsiah Reformatory at Fatehgarh, and one (almost an infant school) in the Sánsiah Settlement at Sultanpur. I see no objection to the proposal, and am disposed to approve it; but I should wish it first referred to the Inspector-General of Prisons, to the Commissioners of Bareilly and Agra, and the visiting Committees of the two Reformatories. It is understood that the schools would be placed under the general control of the Department, but that their immediate supervision would not be removed from the hands in which it now is.

11. It may be ascertained, with reference to paragraph 38, whether the Talúkdárs of Oudh are willing to give assistance in building a school for the proposed school of Art, or would prefer to aid in the construction of an industrial school at Lucknow, of which the need may be regarded as more urgent. At present nothing more can be done as to a school of Art: though if assistance in building is promised the question of funds for maintenance will be considered; and the scheme examined more closely.

12. The establishment of an agricultural school at Cawnpore must, I think, await considertion until we see what funds may be available after such necessary expenditure as must be incurred on the other proposals.

13. The above remarks dispose of the several recommendations of the Committee, so far as, at present, they can be dealt with. The best thanks of the Government should be communicated to each member of the Committee for their careful and useful report. While carrying on the duties of their several Departments they visited each Presidency and Province of India, studying on the spot the institutions connected with technical instruction, and carrying out, at a cost of much labour, without remuneration and at much personal inconvenience to themselves, the instructions communicated to them by the Government. They have discharged to the entire satisfaction of the Government the duties confided to them. Intimation to the above effect will, accordingly, be sent to each of the members, with an expression of my own personal thanks for the assistance they have been good enough to give me.

14. As the Report of the Committee will for some time be under consideration in one or other of its branches, and as it contains no proposals of a confidential nature, it may be desirable to communicate it to the Press, where notice of it may possibly attract attention and obtain for us some assistance in considering its contents. Copies should, therefore, be sent to the *Pioneer*, *Morning Post*, *Express*, and all the chief Native papers, whether printed in English or the Vernacular. As the matter is one which I should wish finally disposed of before resigning office, I should be glad if the several departments and officers concerned will give it their best and early attention. Many details will have to be disposed of, and a great number of points which require careful consideration will arise in the course of discussion; and to enable these to be finally settled, so that the matter may take shape before the close of 1892, will need the constant supervision and control of the officers charged with the disposal of the matter.

A. COLVIN,

*Lieutenant-Governor.*

*The 18th July 1891.*

# PUNJAB.

## *No. 12.—Report of the Committee on Technical Education.*

**No. 12 Committee on technical education, PUNJAB, 1888.**

No. 137, dated 11th July 1888.

From—COLONEL W. R. M. HOLROYD, Under-Secretary to the Government of the Punjab, Home (Education) Department,

To—The Secretary to the Government of India, Home Department.

I am directed to address you with reference to your letter No. 7—214, dated 23rd July 1886, with which you forwarded a memorandum drawn up in the Home Department on the subject of Technical Education in India, and requested that His Excellency the Governor-General in Council might be informed whether the suggestions made in this memorandum, so far as they relate to Technical Education in the Punjab, met with the approval of His Honour the Lieutenant-Governor; and, if so, what steps His Honour, having due regard to financial considerations, would propose in order to give effect thereto.

2. On the receipt of the memorandum it was determined by His Honour the Lieutenant-Governor to appoint a Committee of selected officers to consider the whole subject and submit practical proposals to Government as the result of their joint deliberations.

1. G. R. Elsmie, Esquire, Vice Chancellor, Punjab University.
2. Colonel E. G. Wace, Financial Commissioner, Punjab.
3. W. Coldstream, Esquire, B.A., Deputy Commissioner.
4. Inspecting Veterinary Surgeon G. Kettlewell, B.A., Principal, Veterinary School, Lahore.
5. J. L. Kipling, Esquire, Principal, Mayo School of Industrial Art, Lahore.
6. Colonel W. R. M. Holroyd, Director of Public Instruction, Punjab.,
7. Dr. W. P. Dickson, M.D., Superintendent, Central Jail, Lahore.
8. Deputy Surgeon-General A. M. Dallas, C.I.E., Inspector-General of Civil Hospitals, Punjab.
9. T. C. Lewis, Esquire, M.A., Principal, Government College, Lahore.
10. W. H. Rattigan, Esquire, M.A., PH.D., D.C.L. (Barrister-at-law), Judge, Chief Court, Punjab.
11. Major-General Æ. Perkins, C.B., R.E., Secretary to Government, Punjab, Public Works Department.
12. Colonel Conway-Gordon, *and subsequently* Colonel W. A. J. Wallace, R.E., Director, North-Western Railway.
13. B. H. Baden-Powell, Esquire, C.I.E., Judge, Chief Court, Punjab.
14. C. T. Sandiford, Esquire, Locomotive Superintendent, North-Western Railway.
15. Brigade Surgeon T. E. B. Brown, M.D., Principal, Medical College, Lahore.
16. E. B. Steedman, Esquire, Director of the Department of Land Records and Agriculture.
17. F. C. Channing, Esquire, Divisional Judge.

3. A Committee consisting of the members noted in the margin was appointed accordingly during the cold season of 1886-1887, and they proceeded after some preliminary discussion to nominate three Sub-Committees in order to consider the question of Technical Education as applied to—

(*a*) Agriculture.

(*b*) Industrial, Mechanical and Artistic pursuits.

(*c*) Professional occupations.

The Sub-Committees on Agriculture and on Industrial pursuits drew up reports which were laid before the General Committee in November 1887; and these reports, together with the proceedings of the General Committee at the meeting at which they were discussed, were laid before the Punjab Government in December 1887. The final disposal of the question was delayed until it could be seen what funds would be available from Provincial Revenues for the promotion of Technical Education, and the opinion of the Educational Conference on certain points that it was determined to refer to them for report had been received and considered.

4. The Sub-Committee on Professional occupations had no recommendations to offer to the General Committee. It was not considered desirable or practicable at present to make provision in this Province for systematic instruction in Engineering; but Mr. Rattigan, the President of the Sub-Committee, drew up suggestions for the consideration of the Punjab University with a view to the improvement of instruction in Law.

5. It has not been found practicable to adopt the entire scheme of the Committee on Technical Education, as their proposals would involve an expenditure of R50,000 per annum, and His Honour the Lieutenant-Governor in the present state of the finances is unable to provide more than R10,000 per annum. Moreover, with all deference to the Committee, which was a very strong one, His Honour is disposed to hold that their recommendations are somewhat in excess of the present real requirements of the Province.

The recommendations of the Sub-Committee on Agriculture include the following proposals:—

"(1) The appointment of a Professor of Agricultural Chemistry and a Professor of Zoology and Botany, each on a salary of R500 rising to R750.

"(2) The introduction of a course of instruction in Chemistry, Botany, Zoology, soils and manures to be made alternative with Arabic and Sanskrit and some other subjects in Anglo-Vernacular High Schools.

"(3) The introduction of a similar course extending to a somewhat lower standard in Vernacular Middle Schools.

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"(4) Instruction in animal and plant life, soils and manuring, cultivation and the disease of crops in Primary Schools.

"(5) Instruction in surveying, book-keeping, etc., in Zamindári Schools.

"(6) The establishment of an Agricultural College and experimental farm.

"As regards the first proposal it would be the duty of the Professors—

"(a) to observe and investigate the conditions of agriculture in Northern India; the resources available for its improvement; and the methods which, under existing local conditions, are most likely to produce the successful utilisation of these resources; questions regarding the health and disease of plants and cattle, etc., etc.

"It was considered that it would be impossible to initiate measures for the improvement of agriculture till officers with leisure to study the above subjects should be appointed.

"(b) to train teachers in special subjects for employment in Secondary Schools.

"(c) to prepare text-books or superintend the preparation of text-books."

6. Funds do not at present admit of the appointment of Professors; and in their absence no means are available of teaching Agricultural Chemistry and the composition of soils with special reference to this Province, as was contemplated by the Sub-Committee in their second and third recommendations. It has, however, been determined to introduce a Science course comprising Chemistry, Botany and Zoology as an alternative subject in the Central Training College and the High Department of the Central Model School, which is attached to the former institution, and in any other High Schools, where efficient arrangements for supplying certificated teachers to give instruction in the subject can be made. It has been determined also to introduce a similar course of a somewhat lower standard into Vernacular Middle Schools, as soon as a supply of efficient Vernacular Teachers of Science becomes available and the necessary text-books can be provided. At present candidates for senior certificates qualifying the holders for employment in Anglo-Vernacular or Vernacular Secondary Schools must satisfy the examiners that they are capable of teaching the English or Vernacular editions of the Introductory, Physics and Chemistry Primers of Huxley's series; but arrangements will now be made to train teachers capable of giving instruction in the higher course.

7. As regards the fourth proposal, with reference to instruction in animal and plant life, soil and manuring, cultivation and the diseases of crops in Primary schools, it should be stated that the Readers now taught contain useful information regarding animal and plant life, but the series has not yet been completed. The Vernacular edition of Fuller's Manual of Agriculture is taught in all Primary Schools; but it is not considered suitable for use in this Province by the Settlement and Land Revenue authorities. The difficulty is to find persons possessing the special information that is requisite and sufficient leisure to write the lessons that are required. Something will, it is hoped, be effected under new arrangements that are contemplated with the Punjab Text-Book Committee, but it would require a specialist with ample leisure to do the work in a thoroughly satisfactory manner.

8. The fifth recommendation of the Sub-Committee regarding instruction in Zamindár Schools will be adopted. Mensuration is taught in all Primary Schools, and in addition to this practical surveying and native methods of book-keeping will be taught in certain schools specially organised to meet the wants of agriculturists.

9. The last recommendation for the establishment of an Agricultural College and experimental farm cannot be adopted at present.

10. The proposals of the Sub-Committee to consider the Industrial, Mechanical and Artistic aspects of Technical Education may be conveniently arranged under the following heads:—

(1) Free-hand drawing in schools for general education.

(2) Special measures for the education of artisans throughout the Province.

(3) The organisation of Technical Schools in connexion with the Railway workshops at Lahore and Rawalpindi.

(4) The extension of the scope and functions of the Mayo School of Industrial Art, and the strengthening of the staff.

11. The writer of the memorandum on Technical Education in India recommends the drawing shall be made compulsory in Middle Schools, and the Committee on Technical Education propose that instruction in elementary free-hand drawing shall be introduced as an experiment in a few selected schools for general education as part of the compulsory programme.

12. The Lieutenant-Governor understands that it would not at present be practicable to teach drawing in Primary Schools; nor would it in his opinion be practically of much use to do so, as the number of pupils in these schools who belong to the artisan class, or who can be expected to take to professions in which the training of hand and eye is important, is extremely small. The disinclination of the labouring classes in India to educate their children, and the restrictions imposed by the system of caste in respect to arts and occupations, make the question a very different one in India from which it is in England. The same arguments apply with greater force to the Secondary Schools, which are attended almost entirely by the sons of traders and shopkeepers and officials of various classes, with a few of the sons of the richer agriculturists in cities and a larger, though still small proportion, of the agricultural class in some of the country towns; His Honor does not think that a knowledge of drawing would be desired by, or be of any practical use to, the lads in these schools, and in the case of Anglo-Vernacular Middle Schools the boys have so much to learn already that it would be difficult to find time for an additional subject.

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13. Under these circumstances it does not appear to His Honor to be desirable that drawing should be made a part of the regular curriculum in schools for general education. At the same time he thinks that an opening for the teaching of drawing should be provided. It has therefore been determined to make both free-hand and mechanical drawing alternative subjects in the High Department of the Central Model School, and to authorize Local Bodies to introduce drawing into Anglo-Vernacular High Departments and Vernacular Middle Departments under their control when certificated drawing masters can be provided. This will meet the requirements of students who desire to become draughtsmen, and also of those who intend to follow the scholastic profession, and who should at school receive such rudimentary instruction in drawing as will enable them hereafter to use the black board to good purpose.

14. The other recommendations of the Committee have been framed with a special view to the fact that the son of the Punjab artisan, while receiving from his father or guardian instruction in manual work, has hitherto had no other education, and that when a workman's son attends school at all, it is almost always with a view to abandoning his hereditary pursuit. The object therefore is to do as little as may be to detach the young artisan from the workshop, and yet to give him if possible some useful theoretical and practical instruction.

15. It has been decided to lay down a course of study for Industrial Schools embracing reading, writing, arithmetic, the geography of the district, of the Punjab and of India, drawing, and carpentry, or blacksmith's work, or such other handicraft as may be hereafter decided on. All Industrial Schools maintained or aided by Local Bodies will be required to conform to this course. They will be divided, like ordinary Primary Schools, into an Upper and Lower Primary Department, and will contain five classes. This measure will at least enable the sons of artisans to obtain some general education, and will tend, it may be hoped, to develop their intelligence. Whether it will have any considerable effect in improving the artistic character of their workmanship can be seen only by actual experience, but His Honour considers that the experiment is worth a trial.

16. The Principal of the Mayo School of Industrial Art has been requested to arrange for the preparation of suitable standards for drawing, carpentry and blacksmith's work, and he will be authorized to grant certificates to men willing to become drawing masters who are capable of preparing students to pass by the standards in drawing.

A certain number of scholarships will be awarded to boys on passing the Lower Primary Examination and will be tenable in the Upper Primary Department; and in like manner a certain number will be awarded on the results of the Upper Primary Examination and will be tenable in the Mayo School of Industrial Art, to which all Industrial Schools will be affiliated.

17. By these arrangements the class of students who join the Mayo School of Industrial Art will be greatly improved. At present the youths who join are of two classes,—first, the sons of artisans who have an hereditary aptitude for industrial art, but have not learnt drawing and have received no general education whatever; and secondly, students who have received a fair general education, but who are for the most part incapable of making satisfactory progress in artistic studies.

18. The objects of the Technical Schools that the Committee proposed to establish in connection with the Railway Workshops at Lahore and Rawalpindi would be—

(*a*) the education of boys under twelve years of age, the sons of artisans employed in the works, of whom it has been ascertained that 450 would be ready to join in Lahore alone, could sufficient accommodation be provided;

(*b*) the instruction of youths above that age already serving as apprentices, who would attend at convenient times.

19. It was considered that the Head Masters of these schools should be men of suitable accomplishments, who have received an English education, and taken up Science at the University Examinations. It was further proposed to obtain from England two Superintendents skilled in the teaching of Science as applied to Mechanics, each on a salary of R500 per mensem. The duties of the Superintendents would at first consist in teaching the European and Eurasian and other apprentices acquainted with English, and in the compilation of manuals, which would be translated for the use of the students; and they would be required, of course, at the same time to study the language.

20. It was believed that under this system we should have in a few years a considerable number of mechanics with a fair general education, their intelligence developed by the instruction they had received, and possessing both a practical and a theoretical knowledge of their business. An excellent career as engine drivers, foremen, etc., would be open to those who showed special ability; whilst men of exceptional talent would probably take a high place in the profession of Engineering. At present the classes who have any natural aptitude for either Mechanical or Artistic pursuits are totally uneducated; whilst the educated classes have no taste or natural aptitude for such occupations and no practical experience.

21. Financial considerations will not admit of the adoption of these ambitious proposals in their entirety. It is impracticable to obtain Superintendents from England, nor will it be possible to maintain two Technical Schools. His Honour has, however, determined to establish one school of the character proposed by the Committee, though on a less expensive footing, in connection with the Railway Workshops at Lahore.

22. The proposal to extend the scope and functions of the Mayo School of Industrial Art and to strengthen the staff is essential to the success of any scheme for the wider promotion of industrial art or for the provision of adequate instruction in drawing, on which all technical education is largely dependent.

23. It is essential that the Principal should examine the students of all Industrial Schools in drawing and in practical work. To render this possible he must be provided with a competent

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European assistant capable of relieving him of a portion of his work and of taking his place when he is absent. It should be added that, irrespective of a more extended scheme, it is necessary that an assistant should be appointed. Mr. Kipling has accumulated a large fund of information with regard to the artistic and industrial capabilities of all parts of the Province, and has established relations with the workmen engaged in these industries. If he is provided with an assistant, who can observe his system and obtain the benefits of his knowledge and experience, and who will be competent to take his place hereafter, there will be no break in the continuity of the institution; whereas, if Mr. Kipling should retire under existing circumstances, the school would collapse, the advantages that have been gained by so many years' experience would be almost entirely lost, and his successor would have to organise a new institution, to work out a new system, and to establish new relations throughout the Province.

24. The Committee recommended the appointment of an assistant on R500 per mensem, and His Honour believes that R400, which is as much as he can arrange to provide at present, is the lowest salary for which the services of a competent person can be obtained.

25. The Committee further considered it essential to strengthen the subordinate establishment of the Mayo School. In this view His Honour concurs, and arrangements have been made to carry the measure into effect.

26. In my letter No. 114, dated 11th August 1886, regarding the measures that had be taken to carry out the recommendations of the Education Commission, it was reported that His Honour proposed to arrange for the introduction into Anglo-Vernacular High Schools of an alternative course in English composition, précis-writing, book-keeping and commercial arithmetic with the view of preparing students for employment as clerks in public offices, mercantile firms, shops, etc., and mention has been made above of the other alternative courses that it has now been determined to adopt. Students of Board Anglo-Vernacular Middle Schools who do not read Arabic or Sanskrit are required to take up Euclid and Algebra, which form an optional subject for the Middle School Examination. Hence it is unnecessary that these youths on joining a High School should devote so much time to Mathematics as boys studying Arabic or Sanskrit who have not yet learnt Euclid or Algebra, and the consequence is that about twelve hours a week can be made available for alternative subjects.

27. I now proceed to summarise the measures that it is proposed to introduce:—

(1) In High Departments of Anglo-Vernacular Schools students who do not learn Arabic or Sanskrit and who have passed the Middle School Examination in Euclid and Algebra will have the option of studying one or two of the following subjects where arrangements can be made to teach them efficiently:—

(*a*) Chemistry, Botany and Zoology;

(*b*) Free-hand drawing;

(*c*) Mechanical drawing;

(*d*) Advanced English composition;

(*e*) Précis-writing, caligraphy, commercial arithmetic, etc.

To these short-hand writing may perhaps be added hereafter.

(2) The University will be requested to make the first four subjects optional subjects for the Entrance Examination, and the Education Department will be directed to hold an examination in the fifth.

(3) When qualified teachers and suitable text-books are available, a course in Chemistry, Botany and Zoology, similar to that laid down for High Schools, but of a somewhat lower standard, will be made an optional subject for Vernacular Middle Schools.

(4) Local bodies will be authorised to introduce drawing as an optional subject in Vernacular Middle Schools when certificated masters are available.

(5) Arrangements will be made in the Central Training College to train Anglo-Vernacular and Vernacular Teachers to give instruction in the proposed course in Chemistry, Botany and Zoology.

(6) A special course will be introduced in certain Primary Schools for Zamíndárs.

(7) A regular course will be laid down for Industrial Schools, and to this all Board and Aided Institutions will be required to conform.

(8) All Industrial Schools will be affiliated to the Mayo School of Industrial Art.

(9) The examination of the students of Industrial Schools in drawing and in handicrafts will be conducted by the Principal of the Mayo School, who will prepare standards for the guidance of the teachers and students.

(10) Scholarships will be awarded to a certain proportion of boys attending Industrial Schools who pass the Upper and Lower Primary Examinations, and will be tenable in the Upper Primary Department of such schools and in the Mayo School of Industrial Art.

(11) Drawing Masters' certificates will be awarded by the Principal of the Mayo School.

(12) A Technical School will be established in connection with the Railway Workshops at Lahore.

(13) It is proposed to extend the scope and functions of the Mayo School of Industrial Art, to appoint a European Assistant, and to strengthen the subordinate staff.

28. The proposal to appoint a European Assistant to the Principal of the Mayo School of Industrial Art on a salary of Rs. 400 per mensem will require the sanction of the Secretary of State

and as the success of the whole scheme may be said to depend to a great extent on this measure, and there are other weighty reasons why it should be carried out, His Honour hopes that it will receive the cordial support of the Government of India, and that the attention of Her Majesty's Secretary of State may be drawn to the remarks on the subject that have been given above in paragraphs 22—24 of this letter.

29. His Honour has reason to believe that Mr. Kipling proposes to visit England during the ensuing vacation, which begins on the 1st August next, and he would recommend that a suggestion should be made to the Secretary of State that advantage might be taken of Mr. Kipling's visit to consult him as to the selection of an Assistant, as he knows exactly the qualifications that are required.

30. It should be stated in conclusion that the funds raised in commemoration of the Jubilee of Her Majesty the Queen-Empress will be expended on the erection of an Institute in which accommodation will be provided for a new Museum and for rooms adapted for lectures on technical subjects.

W. R. M. HOLROYD,

*Under-Secretary to the Government of the Punjab,*
*Home (Education) Department.*

## *No. 12 (a).—Reply from the Punjab* re *the industrial survey and formation of a technical committee.*

No. 61, dated the 15th February 1889.

From—Colonel W. R. M. Holroyd, Under-Secretary to Government, Punjab, Home (Education) Department,.

To—A. P. MacDonnell, Esq., C.S.I., Secretary to the Government of India, Home Department.

With reference to paragraph 25 of Resolution No. 199 of the Government of India in the Home (Education) Department, dated the 18th June last, on Sir Alfred Croft's report on the state and progress of education throughout British India, and the enquiry contained in your letter No. $\frac{14}{461}$, dated 2nd November last, as to the action taken in the Punjab towards carrying out the suggestion made in the paragraph above referred to, I am directed to forward a copy of a summary of the Art Industries of the Punjab drawn up by Mr. Kipling, Principal of the Mayo School of Industrial Art, and to report as follows.

2. Notes on the Art Industries of the Punjab prepared by Mr. Kipling and expanded from those given in the "Gazetteers" have been published in the Indian Art Journal, and the summary that accompanies this letter was drawn up for the Revenue and Agricultural Department. Monographs on the principal manufactures are also issued periodically from the Financial Commissioner's Office and published for information. With regard to the small degree to which existing industries are centralized, the simple nature of the handicrafts, and the small capital employed, it does not appear that anything more than this is required at present in the Punjab, and the preparation of a more elaborate survey with statistics would demand, for adequate treatment, a special agency. Nor would such a survey in the Lieutenant-Governor's opinion bring us, in any material degree, nearer to the desired object in this province.

3. As regards the second suggestion contained in paragraph 25 of the Resolution on Sir Alfred Croft's report to the effect that a Committee should be formed of educational experts and professional men, who should make suggestions from time to time for the supply of appropriate means of technical education, for modification of the State system of public instruction, for the establishment of a Technological Institute, for the enlargement of Schools of Art and Design, and for the larger co-operation of the University in the promotion of the object in view, I am to state that a Committee was appointed in 1886 to consider the whole question of technical education, and that the measures that it was resolved to adopt, on the receipt of the recommendation of the Committee, were reported to the Government of India in my letter No. 137, dated 11th July 1888. A Committee of this description must in the Punjab consist almost exclusively of officials who have very heavy regular work, which it is already difficult for them to perform satisfactorily. When additional work is thrown upon them, it is either done superficially or their regular work must suffer. Under these circumstances His Honour is indisposed to reconstitute the Committee or to give it a permanent character, unless and until it is apparent that this measure would be followed by some very decided advantage. At present, so far as this Province is concerned, it seems desirable to wait until the effect of the measures now in course of introduction here becomes apparent, and until a lead can be obtained from successful action taken in more advanced Provinces. When some experience has been gained, and the new buildings in commemoration of Her Majesty's Jubilee which are to comprise a museum and class-rooms for technical instruction, have been completed, it will be desirable to consider the expediency of taking further action. The Lieutenant-Governor, however, will not fail to take action sooner in any way which may appear practicable. He has hope that the Municipal Committees of Dehli and Amritsar may promote and develop technical education by means of technical schools in those cities, and will do his best to encourage the idea, and to guide it towards a practical end.

## *No. 12 (b).—Mr. Kipling's note on Art Industries in the Punjab.*

### SECTION I.—FINE ARTS.

#### Class 1.—Printing and Drawing.

*Local Varieties.*—Delhi miniatures, paintings on ivory and paper, historical and contemporary portraits, views of the sacred places of Muhammadans and of ancient buildings in Northern India, as the Taj, Agra; Jamma Masjid, Delhi, and many others.

*Descriptive Remarks.*—The Delhi miniaturists are believed to be of Persian descent. Their ancestors were employed originally at the Mogul Court, especially in book illumination. The ivory miniature was probably a European suggestion. These artists copy and colour photographic portraits successfully. Much of their work is set in brooches and other articles of jewellery, or in craved ebony caskets, and occasionally bound up in albums.

CLASS 1.—PRINTING AND DRAWING.

*Local Varieties.*—Ethnological pictures and Hindu mythological pictures.

*Descriptive Remarks.*—At Jhang and Nawashahr, in the district of Jullundur, ethnological pictures are produced by Pir Bakash and Sani, painters, and at Lahore, Kangra and Kapurthala Hindu mythological pictures.

CLASS 2.—ENGRAVINGS AND LITHOGRAPHS.

*Local Varieties.*—Lithographs illustrating cheap books of Punjab stories, such as Raja Rasalu, etc.

*Descriptive Remarks.*—These are coarsely executed, and are seldom good in design.

CLASS 3.—PHOTOGRAPHS.

*Local Varieties.*—Photographs of ancient and modern buildings in the Punjab.

*Descriptive Remarks.*—There are a few native photographers and several European who practise the art. It is curious that an art so easily learnt should be so little practised.

## SECTION II.—DECORATIVE ART.

CLASS 1.—ARCHITECTURAL DESIGNS AND MODELS.

*Local Varieties.*—Architectural designs and models.

*Descriptive Remarks.*—The preparation of designs and models as adjuncts to builder's work has been only occasionally practised in India. Architectural drawing forms a large part of most native, pictures, but it is usually introduced as an accessory merely, and is seldom done to scale.

CLASS 4.—MODELS IN CLAY, WAX, TERRA COTTA, ETC.

*Local Varieties.*—Delhi models of fruits, serpents, figures, etc.

*Decriptive Remarks.*—The models of fruits resemble those of Lucknow. Excellent models of poisonous snakes are made at Delhi in *terra cotta* and coloured in water colours for the use of District Officers in identifying poisonous serpents. The human figures attempted are not so good as those of Lucknow.

CLASS 4.—MODELS IN CLAY, WAX, TERRA COTTA, ETC.

*Local Varieties.*—Umballa figures.

*Descriptive Remarks.*—These are made by Lucknow men settled in Umballa.

CLASS 5.—DECORATIVE PAINTING AS APPLIED TO ARCHITECTURE.

*Local Varieties.*—Fresco painting Amritsar, Delhi, etc.

*Descriptive Remarks.*—The practice of painting on wet, freshly-laid plaster still survives. It was possibly imported by Italian artists. The polishing or rubbing in of the colour with a small iron spatula passed over the surface is, however, peculiar to the Indian practice. There are several Mistris at Amritsar who work on the continually renewed decorations of the Golden Temple and at other places.

CLASS 5.—DECORATIVE PAINTING AS APPLIED TO ARCHITECTURE.

*Local Varieties.*—Distemper painting, Delhi, Amritsar and Lahore, etc.

*Descriptive Remarks.*—Ordinary distemper painting is practised almost everywhere in the Province.

CLASS 5.—DECORATIVE PAINTING AS APPLIED TO ARCHITECTURE.

*Local Varieties.*—Painting on wood in water colour protected by varnish, Delhi, Amritsar, Lahore, etc.

*Descriptive Remarks.*—There is but one really indigenous form of painting in which linseed oil, the chief vehicle in European work, is used and that is on the very odd and out-of-the-way Afridi fabrics popularly known as Peshawar lac cloths. The native practice, of surface decoration on wood is to cover the ground either with cloth or san fibre mixed with whiting and glue, or in some cases to use fibre for stopping crevices only. Over this, sheets of *panna* or tin-foil are pasted, and on this metallic ground designs are painted in water colours, some of which when varnished are transparent. The varnish too is often yellow, and thus such portions of the tin-foil as are left become golden, while transparent blues, etc., are lighted through with a metallic sheen. The work still survives in a fitful fashion. It probably orginated from the necessity of closing up the pores of the wood so as to prevent resinous exudations from blistering the work during the summer heats—a precaution which is only partly successful. Doors and ceilings exist of old work which are really beautiful.

The ceiling painting of Amritsar and other places is also generally in water colour protected by varnish. But the use of linseed oil is stedily gaining ground.

CLASS 6.—DECORATIVE PAINTING AS APPLIED TO ARTICLES, OF DOMESTIC USE.

*Local Varieties.*—Kamagri or Kamangari work on bows at Muzaffargarh; on boxes, panels, etc., at Delhi, Jullundur, Lahore, etc.

*Descriptive Remarks.*—The decoration of the bow (*kaman*) which, with its accompanying quiver *tirkash*, was always gaily painted, has given its name to the painting on wood of small articles of domestic use on similar principles to those stated above. The varnish in these articles is always applied with the palm of the hand.

CLASS 6.—DECORATIVE PRINTING AS APPLIED TO ARTICLES OF DOMESTIC USE.

*Local Varieties.*—Kashmir *papier-mache* and wooden painted ware trays, stationer's sets of blotters, inkstand, pen-tray, etc., caskets, miniature boats, paper knives, card boxes.

*Descriptive Remarks.*—All the objects in this class are popularly described as *papier-mache;* many of them, however, are of wood. The patterns are variations of shawl patterns, but of late in response to the English demand for something "chaste," the rich colouring and bold patterns formerly in vogue have given way to a somewhat sickly monochrome of cream colour and gold, Real gold is sometimes used in this work, and, as in other Indian decorative work, the colours are usually mixed with water and protected by Sundras varnish. The Prices of these goods are low, but there is no great demand for them, and they are now mere stationer's wares.

CLASS 7.—DECORATIVE CARVING AS TO ARCHITECTURE.

*Local Varieties.*—Architecture details, as doors, windows, etc., in shisham wood from Batala, Gurdaspur District; Amritsar; Chiniot, Jhang District; and other places in the Punjab.

*Descriptive Remarks.*—One of the specialities of the Punjab is the *chaukat* or frame of wood richly carved for door or window. The places mentioned are those from which the best examples have been sent to various exhibitions, but the wood carver's art is in reality throughout the Province considered as part of the carpenter's business, and there are few towns or villages without good examples.

CLASS 7.—DECORATIVE CARVING AS APPLIED TO ARCHITECTURE.

*Local Varieties.*—Architectural details in deodar wood from Bhera, Shahpur District.

*Descriptive Remarks.*—At Bhera, Shahpur District, the cheapest wood carving in the Punjab (probably in India) is wrought. The wood used is deodar, and the whole of the surface of door-frame or of the window or balcony is covered with bold carving of foliage and geometric diaper very simply executed with a kind of V cut.

## SECTION III.—MUSICAL INSTRUMENTS.

CLASS 1.—WIND INSTRUMENTS.

*Local Varieties.*—Temple horns (*Ransingha*) are mostly made in the hilly districts, such as Chamba, Simla, Kangra and other places; *Bin Bansri*, Amritsar, Lahore, etc.

*Descriptive Remarks.*—The musical instruments of the Punjab are all of old, unvaried traditional forms, except a few that are peculiar to the frontier (as the Mandolin-shaped Rabab). The others are always the same wherever found.

CLASS 2.—STRINGED INSTRUMENTS.

*Local Varieties.*—*Tambura, Sitar, Tuas, Maddham, Sarangi, Ektara, King, etc.*, are produced at Delhi, Shahabad, Hoshiarpur, Jullundur, Kapurthala, Amritsar, Lahore, etc.

*Descriptive Remarks.*—There are two classes,—the rough, cheap and feeble instruments, such as the Ektara, King, etc., used by faqirs, beggars, etc., and the more elaborate, which are made of *tun* wood and are inlaid with ivory as the Sitar), or elaborately painted and varnished (as the Bin and the Taus).

CLASS 3.—INSTRUMENTS OF PERCUSSION.

*Local Varieties.*—*Dhol, Dholki,* Cymbols, etc., Lahore, Amritsar, Hoshiarpur, Kangra, and many other places.

*Descriptive Remarks.*—The most popular of all instruments is the *Sitar*, a sort of lute. It is made in various forms, all having a general similarity. We have the "*Maddham,*" "*Charga,*" the "*Tarbdar.*" The *Maddham Sitar* is the commonest. It has five, sometimes six, strings of steel and brass; it is a fretted instrument, and the frets (sixteen in number) are not fixed as in our guitar, but are moveable and are arranged for the particular "rag" or melody by the performer. The "*Charga Sitar*" has no frets and only four string. The "*Trabdar*" has an under-string set of five steel wires (as in the *Bin*), which are sympathetic or jingle in sympathy with the upper strings. The *Taus* is a many-stringed instrument, the body being shaped like a peacock. It is played with a bow of black horse hair. The "*Bin*" is an instrument played with the finger guarded by a "*Mizrab,*" or wire thimble. It consists of a long narrow board with the pegs at end and the disk fretted, and supported on two hollow gourds for resonance. The drone or jingle is given by a set of five "sympathetic strings." There is another instrument called "*Bin*" not to be confused with the first described. This is a rude, double flageolet inserted into a small gourd. It is played by snake-charmers and beggars, and is often distinguished as the "*Bin joge.*"

Other stringed instruments, as the Psaltery and the "*Kaun*" or harp are now very rare. A quaint and curious instrument is the *Saringi* or fiddle. In this the strings are of thin brass wire. Wind instruments capable of variety of tone hardly exist, except in the "*Bin*" and rude *sarnas* or bagpipe and several small flutes. Various trumpets and horns are used in temple worship and ceremonials, notably an enormous brass trumpet about 8 feet long (made in pieces), used in Kangra. There are also horns, conch shells, etc., but all these give only one or two notes and are harsh and discordant, and not to be accounted as musical instruments at all. Drums of every form are used, from the huge barrel-shaped "*Dhol*" to the *Tobla* or pair of small drums and the *Khanjri*, hand tambourine with bells. Kettle drums of sizes are also used (Nakara, Dhausa and Naubat). Many of the instruments enumerated are ornamented with carving, inlaid ivory, and decorative painting and guilding.

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## SECTION IV.—JEWELLERY.

CLASS 1.—GOLDS AND SILVERSMITH'S WORK, INCLUDING FILIGRAIN SETTING OF PRECIOUS STONES.

*Local Varieties.*—The following are the ornaments generally worn by native women in the province and made everywhere :—

*Head.*—Chauk, Phul, Chaukian.

*Forehead.*—Chand, Tika, Daoni, etc.

*Nose.*—Nath, Long, Machhli, Tili.

*Ear.*—Valian, Murkian, Vala Ghungridar aud Motidar, Jhumke, Dhedu, Tid, Machhil, Pipalpatre, Zanjir and Mahen, etc.

*Neck.*—Chandar Seni Har, Kallian, Khanta, Henkal, Chaukian, Champakali, Mohrau, Mala Tulsi, Has, Kanthi, Jugnian, etc.

*Hand.*—Arsi, Mundrian, Ratan Chauk, Anguthe.

*Wrist.*—Churian, Banka, Band, Ponchian (3 or 4 kinds), Kare Bahin Val.

*Arms.*—Bazuband, Bohatte, Anant.

*Waist.*—Taragi, Peti, Zanjiri.

*Ankles.*—Tore, Karian, Sangli.

*Toes.*—Anguthe, Chhalle, Mehndi, etc.

*Descriptive Remarks.*—These ornaments are made in gold or silver, the former for the use of the rich classes and the latter for the poor. No Hindu?

The prices are supposed to be regulated by the weights; an enhancement for labour of from one anna to four annas per tola is charged for silver and for gold from two annas to one rupee per tola.

CLASS 1.—GOLD AND SILVERSMITH'S WORK, INCLUDING FILIGRAIN SETTING OF PRECIOUS STONES.
DELHI JEWELLERY.

*Local Varieties.*—In addition to the purely native ornaments above quoted, Delhi produces also gold bracelets of various kinds mounted with miniature paintings, mat pattern, etc., crescent and quatrefoil-shaped filigree brooches, necklaces, belts, rings set with precious stones, studs, solitaires, and indeed every kind of ornamental jewellery.

*Descriptive Remarks.*—The chief characteristics of the best Delhi jewellery are the purity of the gold and silver employed, the delicacy and minuteness of the workmanship, the taste and skill displayed in the combination of coloured stones, and the aptitude for the imitation of any kind of original on the part of the workman. Its faults are occasional flimsiness and a gaudiness which is perhaps too harshly judged by comparison with the sober and massive style now in fashion in Europe. The competition of the present day also has caused a falling-off in the purity of the metal. Among the articles peculiar to, or better done at, Delhi than elsewhere may be mentioned the *babul* work in gold and incrustations of gold and jewels in floriated patterns on jade.

CLASS I.—GOLD AND SILVERSMITH'S WORK INCLUDING FILIGRAIN SETTINGS OF PRECIOUS STONES.

*Local Varieties.*—Panipat beads.

*Descriptive Remarks.*—Necklaces of round silver beads are peculiar to Panipat, Karna District. Prices from Rs. 10 to Rs. 30.

CLASS 1.—ENAMELLED JEWELLERY.

*Local Varieties.*—Enamelled ornaments are made at Delhi, Kangra, Mooltan, Bahawalpur, Jhang and Hazara.

*Descriptive Remarks.*—In this class Delhi takes the first place, and some enamel there wrought is almost equal to that of Jeypore. The backs of jewelled ornaments of gold are frequently enamelled, a bright translucent red being, as at Jeypore, the favourite colour. The enamelling of Mooltan, Jhang and Kangra is principally in dark and light blue. Red and yellow are not so often seen, and the colours though true vitreous enamel, are opaque. It might be described as *Champleve* in so far as that the enamel is laid in hollows between raised lines of metal. These are, however, produced by hammering the silver plaque into a steel *thappa* or die and not by graving out. At Bahawalpur, objects of large size are produced and they have one or two translucent colours. The Kangra objects are in patterns peculiar to the hills. In Hazara the only colours are a crude green and sometimes yellow on silver.

## SECTION V.—MANUFACTURES IN METAL.

CLASS 1.—GOLD AND SILVER PLATE.

*Local Varieties.*—Goblets, mugs, trays, salvers, cooking utensils, *golabpash*, huqqas, etc., are made at Delhi, Kapurthala, Jullundur, Amritsar, Lahore and Srinagar.

*Descriptive Remarks.*—There is said to be only one exclusively silversmith at Delhi who regularly produces objects of any size. The ordinary silversmiths who are to be found in every village and town confine themselves principally to ornaments and are frequently quite as much money-lenders as artificers. Large objects are made for Native Courts, frequently by a workman who, after the old feudal fashion, is a State servant. There is not much demand for plate in the European sense, and when it is wanted in the form of trays, plates, cups, huqqas, *chilams*, household utensils and temple ornaments, the work is often undertaken by a *laliyar*, who habitually works in copper, and who works at a cheaper rate than the silversmith proper.

CLASS 2.—KOFT OR DAMASCENED WORK.

*Local Varieties.*—Kotali Loharan (east and west), District Sialkot.—Arms and armours, shields, salvers, plates, trays, bows, caskets, inkstands, *kalamdans*, cigar cases, paper-cutters, etc., etc.

Gujrat— Ditto. ditto.

Lahore—Shields, swords, handles, daggers, armours, etc.

*Descriptive Remarks.*—This art, which takes its European name from Damascus, was formerly extensively practised on the arms and armours made in the chief towns of the Punjab. It is now localized at Kotli (Sialkot) and at Gujrat. The articles made are chiefly ornamental small wares for decorative purposes. The art consists in incrusting or inlaying a wire of one metal, usually gold or silver, on another in ornamental patterns: gold and steel are the favourite materials. In the best examples (*tár-i-nishán*) the pattern is first incised and the wire is laid in. In the ordinary work of the Punjab the iron or steel is first roughened all over and the gilded silver wire is laid on in foliate patterns and burnished into its place. The ground is afterwards blued by heat. The modern workers at Gujrat and Sialkot are injured by the want of some reasonable purpose to which to apply their art. At present they snatch at every European article, however, worthless in the shape of ornament, inkstand or platter, to copy. Moreover the habit of bargaining and the beating down of prices compels the men to a cheap and superficial sort of work in which the gold is inferior and lightly applied and the design wanting in character and too diffuse.

CLASS 3.—BRASS, COPPER AND MIXED METAL.

*Local Varieties.*—Amritsar copper engraved and tinned-ware after Kashmir patterns, chiefly circular dishes, samavers, etc.

*Descriptive Remarks.*—At Amritsar the Kashmir colony have introduced the copper samavar or tea-urn with a heating arrangement. This and other wares are often engraved and tinned.

CLASS 3.—BRASS, COPPER AND MIXED METAL.

*Local Varieties.*—Peshawar copper-ware, samavars, *aftabus*, trays, salvers, etc.

*Descriptive Remarks.*—The Peshawar patterns differ from those of Amritsar. All are Persian in origin.

CLASS 3.—BRASS, COPPER AND MIXED METAL.

*Local Varieties.*—Kashmir engraved copper-ware for European use, as claret jugs, salvers, tobacco jars, tea services, etc., with some articles of native forms.

*Descriptive Remarks.*—The Kashmir patterns are minute and founded mostly on shawl designs. The ware is generally equally covered with deep chasing. Many of the objects are sent to England to be electroplated or gilded but a few are plated in this country: sometimes the surface is tinned and the engaved ground is filled in with a black composition simulating *Niello*. The chief native use in Kashmir and Central Asia, where the art probably originated, is for the *chagun* or tea-pot, a jug-like vessel with the spout attached along nearly its whole length, and for the *aftaba* and *chilamchie* or water ewer and basin. The European articles are made in response to the demands of tourists and are of recent origin. A good *aftaba* costs from R15 to R30. The prices of other articles are regulated by weight.

CLASS 3.—BRASS, COPPER AND MIXED METAL.

*Local Varieties.*—Delhi nests of copper *degchis*, cups, trays, small fantastic toys and cooking utensils.

*Descriptive Remarks.*—The Delhi copper-smiths are no less skilful than the workers in silver. In the Lahore and other copper bazars, visitors are invariably offered "real Delhi *degchis*," and most of the smiths from other places admit that they are not so skilful with the hammer and stake as those at Delhi. In shaping a circular vessel of changing diameter they find it necessary to solder pieces on, while a good Delhi copper-smith shapes the whole without joint from one piece. Nests (*ganj*) of *degchis*, with a cleanly defined edges fitting closely into each other, are the usual articles made, and they are often admirable specimens of plain hammer-work. Brass articles are tastefully ornamented by the *chatera* with foliage in low relief. There is a considerable production too of small fantastic toys in brass roughly made, but often ingenious and pretty.

CLASS 3.—BRASS, COPPER AND MIXED METAL.

*Local Varieties.*—Jagadhri (Umballa District) lamps and cooking utensils of all sorts.

*Descriptive Remarks.*—Tasteful and pretty lamps, with branching arms touched with colours on the leaves, and many other forms of brass-ware, are exceptionally well made at Jagadhri.

CLASS 3.—BRASS, COPPER AND MIXED METAL.

*Local Varieties.*—Rewari (Gurgaon District) huqqas, *kolis*, cart-bells, *kalamdans* and cooking utensils of sorts.

*Descriptive Remarks.*—At Rewari there is a large manufacture of brass-ware. The greater bulk consists, of course, of cooking utensils, but fancy articles, involving chasing, engraving and parcel tinning, are also produced and exported to various parts of the Punjab and Rajputana.

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CLASS 3.—BRASS, COPPER AND MIXED METAL.

*Local Varieties.*—Hoshiarpur cooking utensils.

*Descriptive Remarks.*—There is a considerable manufacture of brass vessels at Bahadarpur near Hoshiarpur, which are exported in some quantities to the hills, whence they are allegod to find their way as far as Ladakh. The finish is exceptionally good.

CLASS 3.—BRASS, COPPER AND MIXED METAL.

*Local Varieties.*—Amritsar copper and brass cooking utensils, huqqas, etc.

*Descriptive Remarks.*—At Jandiala in the Amritsar District there is a considerable manufacture of plain brass-wares, which are brought into Amritsar for sale. The brass casting is well done, but work is not ornamented to such an extent as at Rewari and Jagadhri. The prices are regulated by weight. There are a few braziers in Amritsar who do brass casting as well as those of any other place.

CLASS 3.—BRASS, COPPER AND MIXED METAL.

*Local Varieties.*—Amritsar.—Panels of repousse copper work boldly embossed in patterns of foliage for the Darbar Sahib or Golden Temple of the Sikhs.

*Descriptive Remarks.*—The embossed copper work is also wrought independently of the Golden Temple by *chatrahs* or chasers, who, like others of their craft, also work in silver on occasions. It is relatively cheap, a large copper panel about 2′ 6″ square, covered with foliage in relief of excellent execution, costing R24.

CLASS 3.—BRASS, COPPER AND MIXED METAL.

*Local Varieties.*—Daska (Sialkot District)—*Kauls* or cups.

*Descriptive Remarks.*—The work done here is good; but there is nothing to distinguish it from that of other places in the Punjab. The cups made of mixed metal are sold at about 7 annas each.

CLASS 3.—BRASS, COPPER AND MIXED METAL.

*Local Varietives.*—Gujranwala—*Degchis tabalbaz* and other cooking utensils.

*Descriptive Remarks.*—Brass vessels of sound workmanship are made here, but they differ in no important respect from those of the rest of the Province. *Degchis* and *tabalbaz* are especially made here.

CLASS 3.—BRASS, COPPER AND MIXED METAL.

*Local Varieties.*—Pind Dadan Khan (Jhelum).—*Jagannathis, ganga sagars* and *gagars*, etc., water jars.

*Descriptive Remarks.*—Brass-wares chased and ornamented are made at Pind Dadan Khan, especially the jagannathis and ganga sagars, which are very characteristic and beautiful in form. The price is regulated by night.

CLASS 3.—BRASS, COPPER AND MIXED METAL.

*Local Varieties.*—Bhawalpur cups and Phagwara cooking utensils.

*Descriptive Remarks*—The chased and plain brass work of Bahawalpur and Phagwara (near Jullundur) respectively is of an excellent finish and character. From the latter place *katoras, thals*, etc., are exported to various parts of the Punjab.

Brass is the Hindu material *par excellence*, and though it is preferred plain for household purposes as being more easily cleaned, as Hindu usage ordains, it is sometimes richly chased or ornamented. The Muhammadans use copper vessels mostly. But to this rule there are many exceptions. Muhammadans on the frontier, following Persian customs, eat from glazed earthenware and are said in the large towns to be gradually adopting English and Chinese earthenware and porcelain—a most desirable consummation from the English pottery manufacturer's point of view, for there are no pottery materials in Northern India capable of being made into good earthenware. Poor Hindus use earthern vessels also. The common vessels in use are as follows :—

*Garwa* (*lota*, Muhammadan), a small brass pot for holding or drinking water.

*Kaul or katora*, a rather flat drinking cup.

*Ganga-sagar* (Muhammadan *abkhora*), a brass ewer for holding water.

*Gilas*, a straight drinking cup, the English "glass."

*Baltoa*, a large vessel for holding water.

*Gagar*, ditto ditto.

*Dol* (some times of iron), a vessel to draw water with.

*Degchi or degcha*, cooking pot.

*Thali* (*tashtri*, Muhammadan), plate.

*Prat*, a tray with a rim.

*Tabalbaz*, a bowl used to hold curds, etc.

CLASS 3.—BRASS, COPPER AND MIXED METAL.

*Local Varieties.—Arti, Tashta, Charnamti, ghanti, sanghasan, nandigan, etc.*

*Descriptive Remarks.*—But few of these are made in the Punjab, and they are usually imported from Benares.

CLASS 5.—ARMS AND ARMOUR.

*Local Varieties.*—Kohat matchlocks.

Ludhiana ditto.

Peshawar ditto, swords and knives.

Bhera swords, daggers and kukris.

Sialkot daggers, swords, chain mail suits and *char aina* helmet.

Lahore shields.

Hissar *guptis* or swords-sticks.

*Descriptive Remarks.*—In accordance with the Arms Act no blacksmith is allowed without a license to make arms in the Punjab. The matchlocks made at Kohat are rather more characteristic than those of any other place in the Province. Chain mail suits and *char aina* or four-plate suits of plate armour are still made for sale to Europeans. Nor is armour entirely gone out of use in the retinues of Native Chiefs.

CLASS 6.—CUTLERY.

*Local Varieties.*—Karnal *sarautas* and scissors.

*Descriptive Remarks.*—Betel-nut cutters are made at Karnal in fanciful forms, the handles being of brass with quaint projections in which small mirrors and pieces of coloured glass are fixed. A good one costs two or three rupees. Scissors are similarly ornamented, the handles being made of brass with bits of coloured glass rudely simulating jewels set therein. A pair of scissors cost about six annas. These articles are made for export.

CLASS 6.—CUTLERY.

*Local Varieties.*—Nizamabad (Gujranwala) many-bladed pocket knives with hooks, screw-drivers, scissors, etc., tobacco-cutters, dinner cutlery, etc.

*Descriptive Remarks.*—Nizamabad in the Gujranwala District is known for its cutlery. The tourist is frequently offered at hotels and dâk bangalows such things which are calculated to display the ingenuity of the maker rather than to serve the convenience of the purchaser. The finish and polish of the articles, though not perfect, is better than the quality of the steel, which, although tough, is deficient in hardness and is often scarcely to be distinguished from good iron. A very rude form of pen-knife with immovable blade and turned up point in a wooden handle seems to be the only article of Nizamabad make that finds a large sale.

CLASS 6.—CUTLERY.

*Local Varieties.*—Bhera table knives, forks, hunting knives, scissors, etc.; daggers, swords generally hilted in stones of various kinds.

*Descriptive Remarks.*—It is not easy to determine whether the stone-handled cutlery of Bhera (Shahpur District) should be classed under the head of lapidary's work or cutlery. The same artizan practises both trades, that is to say, he forges and finishes the blade and fashions the false jade or serpentine hilt of the *peshqabz* or of the hunting or dinner knife. Old files of English manufacture are sometimes forged into daggers and knives of good quality. But country iron is generally used.

CLASS 6.—CUTLERY.

*Local Varieties.*—Gujrat and Sialkot cutlery.

*Descriptive Remarks.*—The blacksmiths at these places are greatly dependent upon the Koftgars to whose order they make their cutlery, such as daggers, knives, betel-nut cutters, scissors, etc. They sell very little independently.

CLASS 7.—IRON AND STEEL WARES.

*Local Varieties.—Dols, karahis,* tongs, *ponis, gugars, parats,* bowls, *tawas,* etc.

*Descriptive Remarks.*—These articles are greatly manufactured at Amritsar and Lahore, and sold to confectioners and the Hindu Sikh beggars who cannot afford to pay for more costly metal.

CLASS 8.—ELECTRO-PLATED WARES.

*Local Varieties.*—Dishes, spoons, forks, cups, huqqa mouth-pieces, huqqas, goblets, wine-glasses, coffee and tea-pots, iron hinges, temple domes, elephant howdahs.

*Descriptive Remarks.*—This class is a very small one. The art of electroplating in the European method is known to a few persons, and in Delhi, Lahore and Amritsar it is easy to get metal-wares replated with very fair success.

CLASS 9.—ENAMELS OTHER THAN JEWELLERY.

*Local Varieties.*—Kashmir enamelled copper, brass and silver *lotas, tombis* (gourd-shaped vessels), *surahis* and other ornamental forms, including the *kangri* or wicker-work, chafferette shape.

No. 12 (b), Art Industries, PUNJAB, 1886.

*Descriptive Remarks.*—Of late years a great development of enamelling on metal has taken place in Kashmir. The colours are principally shades of blue; red and yellow being less common. The patterns are modifications of shawl decoration motives. A light and somewhat sickly blue is the favourite colour for silver work. Gilding is usually combined with enamel. None of the colours are transparent.

CLASS 9.—ENAMELS OTHER THAN JEWELLERY.

*Local Varieties.*—Mooltan and Jhang wares.

*Descriptive Remarks.*—Occasionally a *gilas* or tumbler-shaped vessel, or a cup and tray, copper or silver, or a pipe mouth-piece, are enamelled at Jhang or Mooltan in the opaque colour peculiar to these places; but there is not a regular production.

CLASS 9.—ENAMELS OTHER THAN JEWELLERY.

*Local Varieties.*—Bahawalpur wares.

*Descriptive Remarks.*—A vessel almost peculiar to Bahawalpur is a silver *mokhabba* or covered dish, which is ornamented with chasing, enamelling and gilding. A slightly translucent blue enamel is peculiar to Bahawalpur.

CLASS 9.—ENAMELS OTHER THAN JEWELLERY.

*Local Varieties.*—Delhi wares enamelled, such as *pandans*, spice boxes, pipe mouth-pieces, huqqas and other wares.

*Descriptive Remarks.*—Enamelling in Delhi is done on small boxes, *pandans*, pipe mouth-pieces, spice boxes, etc., for the use of the nobility. Delhi is known for its good enamel, and its work is but little inferior to that of Jeypore.

CLASS 9.—ENAMELS OTHER THAN JEWELLERY.

*Local Varieties.*—Kangra enamelled wine cups.

*Descriptive Remarks.*—Small wine cups in enamelled silver were formerly made for Native Sardars in this region, and are still occasionally produced.

## SECTION VI.—ART MANUFACTURES IN WOOD, IVORY, ETC.

CLASS 1.—CARVED FURNITURE AND CARPENTRY.

*Local Varieties.*—Simla book-cases, chiffoniers, small tables, arm-chairs, couches, wall brackets, etc.

*Descriptive Remarks.*—A trade in furniture carved in walnut wood has grown up of late years in Simla. The workmen are mostly Sikhs from the adjacent plains. The fret saw cutting, which once enjoyed a slight popularity in Europe, is imitated, and Swiss brackets, clocks, etc., carved in wood, have furnished some models. Besides these trivialities, some objects in a better style have been occasionally produced.

CLASS 1.—CARVED FURNITURE AND CARPENTRY.

*Local Varieties.*—Gujrat camp chairs and tables.

*Descriptive Remarks.*—The most characteristic form of the trade at Gujrat is the manufacture of chairs and camp furniture. The large and cumbrous, but undeniably comfortable, easy chair, known as the Capperina chair from its introduction by a District Officer named Capper, and several forms of camp chairs, are the best known. The trade is an increasing one, as the work is fairly strong and well finished and the prices moderate. The wood used is shisham.

Furniture is so little used by natives that it is simply produced to the order of Europeans. A native rich man's house is often well furnished with carpets, hangings, *musnads*, etc., but ornamental furniture is unknown save to those who have adopted the European style. Tables, chairs, low wood octagonal chairs and the *takhtposh* are only in use. These are produced everywhere in the Province. Delhi, Hoshiarpur, Jullundur, Lahore, Kasur, Amritsar and Bhera, in the Shapur District, produce such things specially.

CLASS 1.—CARVED FURNITURE AND CARPENTRY.

*Local Varieties.*—Kartarpur chairs.

*Descriptive Remarks.*—Kartarpur, a town in the Jullundur District, is known for its cheap chairs with and without arms. They are made of shisham and tun wood and sold very cheap.

CLASS 1.—CARVED FURNITURE AND CARPENTRY.

*Local Varieties.*—Delhi carved sandal-wood and ebony boxes set with oval Delhi miniature and bound with silver or plated brass.

*Descriptive Remarks.*—These sell according to size and number of paintings from R280 to R25 each.

CLASS 2.—INLAID WORK.

*Local Varieties.*—Hoshiarpur *chaukis*, almirahs, wall brackets, tables, chairs, boxes, desks, rules, picture frames, cabinets (ivory inlaid), *Kalamdans*, side-boards, brass inlaid boxes, etc.

*Descriptive Remarks.*—Ivory and brass inlay is one of the manufactures of the Punjab which have been revived and extended in the last few years. Now the workmen of Hoshiarpur drive a considerable trade in ivory inlay, especially at the village Ghulam Husain Bassi. Several workmen combine in the work. Shisham wood is exclusively employed and ivory. A small edging of blackened wood is occasionally introduced to set off the ivory.

Brass inlay is also practised in Hoshiarpur; but perhaps the best work comes from Chiniot (Jhang).

CLASS 3.—IVORY CARVING.

*Local Varieties.*—Amritsar—Combs, paper-cutters, card boxes and *churis* (bracelets).

Delhi—Combs, paper-cutters, card boxes, figures of sorts, etc.

Patiala—Little figure toys.

Shapur (Sahiwal)—Chessmen and little toys.

Mooltan—Bracelets and toys.

Lahore—Combs, *churis* and toys.

*Descriptive Remarks.*—Ivory carving is not an art which flourishes in the Punjab. At Amritsar great quantities of combs are made and also paper-cutters and card boxes ornamented with geometrical open-work patterns of some delicacy of execution; but no great interests in design. Figure work is but seldom wrought in this Province owing to the predominance of Musalman notion. The ivory carvers in the *Dariba* at Delhi reproduce the work of Murshidabad in all its variety, but seem to produce nothing of local origin.

CLASS 4.—LACQUERED WARES.

*Local Varieties.*—The *Kharadi* or wood-turner is found in nearly every town and village of the Province, but the following places have earned a particular reputation :—

Hoshiarpur—Bed-legs, *garwas*, *surashis*, boxes, rulers, toys, etc.

*Descriptive Remarks.*—The Hoshiarpur lacquer differs from that of Pakpattan in the use of metallic (tin) ground under transparent colour, and in addition to the scratched work of colour, figures of a mythological character are boldly painted and covered with transparent lacquer.

CLASS 4.—LACQUERED WARES.

*Local Varieties.*—Dera Ismail Khan—Ornamental boxes, trays, globular boxes, types, etc.

*Descriptive Remarks.*—The lacquer of Dehra Ismail Khan is unique in character. Very few colours are employed, and the pattern is usually of fern-like scrolls of almost incredible minuteness and delicacy of execution, mostly wrought or rather scratched by women. The caskets, tables, etc., are lavishly ornamented with ivory studs, flowers and similar projecting ornaments.

CLASS 4.—LACQUERED WARES.

*Local Varieties.*—Pakpattan (Montgomery)—Bed-legs, charpoys, boxes, sticks, chairs, etc.

*Descriptive Remarks.*—The articles are first turned in the rude lathe of the country, and the colour is applied by pressing sticks of coloured lac, like pieces of sealing-wax on the revolving surface. Sometimes two or three colours are laid on in patches to produce a mottled or marbled ground. Borders are usually in two or three colours superposed. A pattern is made by scratching with a sharp style or chisel. Thus a red flower is made by scratching through the black and green coats; for leaves the black is only cut away exposing the green, and for a white line all these are cut through to the white wood. This is obviously work requiring great delicacy of hand and long practice. The articles are unique both in the solidity of surface and in design.

CLASS 4.—LACQUERED WARES.

*Local Varieties.*—Ferozepore—Lac turnery work.

*Descriptive Remarks.*—A workman of Ferozepore has almost raised lac turnery to the dignity of fine art by his skill in pattern scratching. He uses the wood of the tamarisk or pharwan for his wares, and not, as elsewhere, shisham or poplar. This wood, though used in Sindh, where wood of any kind in scarce, is seldom touched by the Punjab workmen. His work is the best of its kind in the Province.

CLASS 4.—LACQUERED WARES.

*Local Varieties.*—Shiwal (Shapur District).—Chessmen and tables, toys of various kinds, plates, teapoys, etc.

*Descriptive Remarks.*—The lac turnery of Sahiwal differs from that of other places in being more crude in colour and simpler in execution. A particularly unpleasant aniline mauve is used, but there is a better class; vases, plateaux and toys made in two colours, red and black, or red or yellow, or black or either. The scratched pattern are bolder and larger than elsewhere.

## SECTION VII.—LAPIDARY'S WORK.

CLASS 1.—AGATE, JASPER AND CORNELIAN WARES.

*Local Varieties.*—Bhera (Shahpur)—Caskets, paper-weights of sorts, whip and stick handles, *hauldilis* (necklaces), etc.

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*Descriptive remarks.*—The green, jade-like stone has not yet been assigned its proper name; it is not true jade, nor do authorities on the subject admit it to be plasma. It is said to be found near Qandhar and to be brought down the River Indus on rafts floated with inflated skins to Attock, whence it is carried to Bhera. Other stones resembling serpentine and Purbeck marble are used as handles and also in the fashioning of toys and small objects as paper-weights, by the lapidary cutlers of Bhera. There is a larger production than finds profitable sale.

CLASS 1.—AGATE, JASPER AND CORNELIAN WARES.

*Local Varieties.*—Amritsar—Necklaces of sorts, small trays and toys, stones for rings, *ponchis*, etc.

*Descriptive Remarks.*—The dealers as well as makers of these neck laces are Kashmiris, resident in Amritsar. This trade received a great impetus from the last Calcutta Exhibition, where they were sent in large number and nearly all sold. The prices vary from R5 to R15 a piece. A little of this work is done at Lahore and Delhi also.

## SECTION VIII.—MARBLES AND STONE.

CLASS 2.—CARVED OBJECTS IN MARBLES.

*Local Varieties.*—Amritsar, Lahore, Chiniot and Delhi carved marbles *rehls* (book stands), chairs and vessels of various sorts.

*Descriptive Remarks.*—Stone-carving is rare in the Punjab. A few toy, and vessels are made at Delhi and Lahore. The workshop attached to the Golden Temple at Amritsar has some good Sikh carvers, who can produce excellent work.

## SECTION IX.—POTTERY.

CLASS 1.—GLAZED POTTERY.

*Local Varieties.*—Delhi porcelain,—*surahis rakabis, abkhoras, lotas, martbans*, tiles, etc.

*Descriptive Remarks.*—This ware is believed to be the only true porcelain in India. It is really a *procelaine tendre* and in a few highly vitrified examples; resembles very closely old Persian ware. The paste or body is powdered felsper, held together for the purpose of working with a mucilage or gum. Everything must be made in a mould, as the material has not the plasticity of ordinary clay. The finer kind is vitreous and semi-transparent. The coarser sorts are identical in texture with the tiles used for the external covering of mosques, etc. At Agra, Delhi and Lahore (*Kashi* work), the colours now used in its decorations are a blue from cobalt and a turquoise from copper. Red and yellow are being attempted, but hitherto with imperfect success.

CLASS 1.—GLAZED POTTERY.

*Local Varieties.*—Mooltan glazed pottery.

*Descriptive Remarks.*—This pottery, which in Europe would be called a faience, has a red or yellowish earthen body, covered with an opaque white enamel in which flint is a large ingredient painted in two colours, dark-blue and turquoise. The work is usually completed at one firing, *i.e.*, the enamel and painting are done on the unburnt clay. The art was originally confined exclusively to architectural details, chiefly tiles for wall limings, finials, tombs, etc. There is now a great demand for this pottery in the form of vases and other ornaments; all decorated in a strictly conventional way, with no trace of Hindu fantasy.

CLASS 1.—GLAZED POTTERY.

*Local Varieties.*—Peshawar glazed pottery, plates, *surahis*, etc.

*Descriptive Remarks.*—This rough faience, a common reddish yellow (earthen) body or paste covered with a soft lead glaze, is chiefly made in the form of plates. Scarcely anywhere else in India is glazed pottery employed in this manner. The ware, considered as pottery, is decidedly poor. But there is a quality of colour in its very simplicity which is pleasing to artists. Of late years an attempt has been made to adapt it to European requirements such as tea sets, etc., but with only moderate success.

CLASS 1.—GLAZED POTTERY.

*Local Varieties.*—Lahore glazed pottery, *martbans, chilams*, cups, etc.

*Descriptive Remarks.*—An examination after rain of the great mounds of brick-burning refuse, which are the only hills Lahore can boast, shows that glazed and coloured pottery must at one time have been more common than it is now. There are signs that it may again come into favour. The price of a good *chilam* is a pice and of a *martban* or jar four annas.

CLASS 1.—GLAZED POTTERY.

*Local Varieties.*—Jullundur glazed tile work.

*Descriptive Remarks.*—Specimens of coloured and enamelled tile work of unusual excellence are produced at Jullundur. Mahammad Sharif, the artist, to whom these works are due, is a striking example of a common form of Oriental secretiveness. He can make all the colours and glazes of the old Mogul tile work as seen on the Nakodar tombs in this district and many other places in the province. He has been persuaded from time to time to send a few examples of his craft to various Exhibitions; but as he works without any assistants, they have to be priced at rates which prohibit their use on any large scale.

CLASS 2.—UNGLAZED POTTERY.

*Local Varieties.*—Various places.

*Descriptive Remarks.*—In addition to the ordinary *bhande* or unglazed ware in common use, there are many characteristic local varieties, *e.g.*, the *khaghazi* pottery made very thin at Gujranwala and Bahawalpur, the painted (water-coloured) pottery made at Hoshiarpur the *adrak* smeared ware of Jhajjar (Rohtak District), the black painted red-ware of Pind Dadan Khan, and in most places water coloured painted toys and images for festive occasions, fairs, etc.

## SECTION X.—GLASS.

CLASS.—BLOWN OBJECTS.

*Local Varieties.*—Delhi and Lahore glass bangles and lamp chimneys; Karnal glass globe, pear-shaped glass carboys. Hoshiarpur glass-wares.

*Descriptive Remarks.*—This art as yet is quite in its infancy. The Hoshiarpur workman is almost the only one who works independently with his own materials. Independently, that is, of foreign aid, for a few glass-blowers at Lahore collect fragments of white European glass and melting them down blow cheap lamp chimneys and bottles.

At Karnal the glass globes are made, which when silvered inside, are broken up into the small mirrors used in *shishadar* ornamental plaster-work for walls and sewn into the embroideries known as *shishadar phulkarîs.*

## SECTION XIII.—LEATHER AND FURS.

CLASS 1.—SHOES.

*Local Varieties.*—Delhi shoes, Hoshiarpur and Jullundur shoes, Kasur, Lahore and Amritsar shoes, Potwari shoes, Peshawar and Kohat *chaplis.*

*Descriptive Remarks.*—Many characteristic forms of shoes are made in the Province, those of Delhi, Rawalpindi, Kasur and Peshawar being the best known. Their prices vary from R1 to R15 a pair. They are generally gold or silver embroidered. European boot-making has also been learned in the bazaars of the larger towns.

*Local Varieties*—Kangra and Hoshiarpur deer-skin trousers, coats, leggings and gloves, etc.

*Descriptive Remarks.*—In Kangra and Hoshiarpur deer-skins are beautifully tanned with the hair intact, and a fine soft skin of a greenish buff colour is made into trousers, leggings and gloves, etc. The prices are from annas four for a pair of gloves to R3 for a fair of *pyjamas.*

CLASS 2.—POSTINS, BELTS AND SADDLERY.

*Local Varieties.*—Kasur and Jhelum saddlery.

*Descriptive Remarks.*—At Kasur and Pind Dadan Khan (Jhelum District) are made trappings, stirrup leathers and whips, etc., which are the best known in the Province.

CLASS 2.—POSTINS, BELTS AND SADDLERY.

*Local Varieties.*—Hoshiarpur, Derajat and Peshawar belts, postins.

*Descriptive Remarks.*—Very delicately embroidered leather (executed in silk) for belts and military accoutrements of the old powder horn and belt types is made at Peshawar, and a little also in the Hoshiarpur District, and some very quaintly patterned belts in coloured silk are made in the Derajat.

CLASS 2.—POSTINS, BELTS AND SADDLERY.

*Local Varieties.*—Bilaspur leather and quill boxes, cigar cases, belts, trappings, etc.

*Descriptive Remarks.*—This quaint and curious work is produced in the Bilaspur State and a little elsewhere also. Black leather is first made into boxes and other forms, then decorated with circles or patterns of green or red leather or leather covered with foil fastened on in the manner of *applique* work, and then the whole is sewed in designs of white with thin strips of the tough and flexible quills of the peacock. The work is probably of Gurkha origin.

CLASS 2.—POSTINS, BELTS AND SADDLERY.

*Local Varieties.*—Peshawar leather mule-trunks.

*Descriptive Remarks.*—Stout leather mule-trunks (*Yukdans*) secured by tinned iron clamps, and completed by diagonal sewing of coarse thread, are made at Peshawar and elsewhere; they are of great durability and can be prepared by coating with boiled linseed oil to resist rain. The cost is from R16 to R20 per pair.

CLASS 2.—POSTINS, BELTS AND SADDLERY.

*Local Varieties.*—Kasur, Chunian, Hissar, and Sirsa leather and brass huqqas.

*Descriptive Remarks.*—Among the most fanciful application of leather is that found at Kasur, Hissar, and other places. Vases for the huqqa are made of leather and ornamented with brass, and sometimes with green leather and studs of silver. The cost of a huqqa bowl or vase is from R7 to R15 each.

CLASS 3.—FURS.

*Local Varieties.*—Peshawar cat-skins, furs, etc.

*Descriptive Remarks.*—These are imported into Peshawar from Kabul. The price is from ₨25 each.

## SECTION XIV.—BASKETS, MATS AND STRAW WORK.

CLASS 1.—BASKETS AND MATS.

*Local Varieties.*—Hazara straw baskets.
Lahore ditto.
Peshawar palm leaf.
Pind Dadan Khan palm leaf.
Muzaffargarh ditto.
Delhi cane baskets.
Simla Hills bamboo.

*Descriptive Remarks.*—The Punjab cannot compete with the fine work in this class, wrought in Bengal and Madras; but there are many characteristic manufactures in which palm leaves, wheat straw reeds, canes and bamboos are used. The Hill districts, Delhi, Muzaffargarh, Hazara, Lahore, Peshawar and Jhelum are a few of the places where good baskets and mat-work are wrought.

# CENTRAL PROVINCES.

## *No. 13.—Minute by Mr. Mackenzie on Technical Education in the Central Provinces.*

No. $\frac{2332}{214}$, dated the 26th April 1888.

From—A. L. SAUNDERS, Esq., C.S., Under Secretary to the Chief Commissioner, Central Provinces,
To—The Secretary to the Government of India, Home Department (Education).

I am directed, with reference to Home Department letter No. 7—215, dated the 23rd July 1886, to forward a copy of a Minute by Mr. Mackenzie on the subject of Technical Education in these Provinces. **No. 13 Technical education in the CENTRAL PROVINCES, 1888.**

MINUTE.

I have during the past year been considering what steps could be taken, with the limited means at my disposal, to stimulate the study of Physical Science in the schools of these Provinces and to advance the cause of Technical Education. I was at first led to hope that the Council of the Morris College would come forward to help in this matter; but that Society eventually preferred to continue its institution on its present basis as an Arts College. I received this determination with regret, feeling satisfied that it was not conceived in the true interests of the youth of these Provinces at the present time, and that as an Arts College the institution was superfluous: but I was of course bound to accept the decision. The Council however agreed to dispense with monthly grant of R150 hitherto drawn by them.

2. In coming now to a conclusion, first generally as to what can be done to give a modern turn to our system of education from Primary up to High Schools, in order to prepare a larger number of students for taking up advanced technical or professional studies thereafter; and secondly, for the direct promotion of Technical Education, I have before me proposals by Mr. Colin Browning, the Inspector-General of Education, and notes on particular matters by my late Secretary Mr. Fraser, by Mr. Fuller, the Director of Land Revenue, Records and Agriculture, and by the late and present Chief Engineers to this Administration: I am indebted to all these officers for valuable assistance and suggestions. I shall not enter into any discussion of principles. Our funds are too small for comprehensive schemes. But we can, I think, do something to lay solid and even broad foundations, upon which our successors may be able to build. If we can in our ordinary schools train the pupils to use their eyes and hands, by making Drawing a necessary part of their education, and if we can stimulate their minds by teaching them the elements of Physical Science, illustrating the instruction by simple experiments, we shall have made at least a good beginning. Then, I think, we can, with great advantage to the Province and to the public service, give some special training in the elements of Engineering, and in Agricultural science. These are the lines I have decided to follow, and I shall restrict myself now to indicating clearly for the guidance of all concerned the steps which it is proposed at once to take.

3. Taking first the High Schools, the line of study in these must of course be dominated by the requirements of the University, and if the University gives greater prominence to physical science studies we shall of course gladly follow suit. Meantime our High Schools are affiliated to Calcutta, and, so far as I can learn, the Calcutta University has for the present decided to limit its action to making Huxley's Introductory Primer and Geikie's Primer of Physical Geography compulsory books for Entrance candidates. These subjects will now therefore be taught by the present staff of instructors in all our High Schools. But we can certainly also see that drawing is taught in these institutions. Provision for instruction in drawing—Geometrical, Model, and Freehand—has already been made in the High Schools of Jubbulpore, Saugor and Raipur. There remain the High Schools of Sambalpur and Burhanpur. The school at Burhanpur has only recently been constituted and may or may not be able to maintain its status. I am not prepared to make a special grant to it at present. But if the Municipality or the local subscribers can find a further sum of R50 per mensem for a drawing master, the Inspector-General will be directed to supply one. For Sambalpur I sanction the appointment of a drawing master on R50, chargeable to Provincial Revenues, with the expression of a hope that local liberality will come forward shortly to relieve the Administration of the charge.

4. I come next to Middle Schools. Where these are attached to High Schools, the drawing masters of the latter will teach of course also the lower classes. There are besides these 34 separate Middle Schools, for which masters will be required. It is impossible to supply all these teachers at once. They can only be found by degrees. As Central Provinces students quality in the subject, we shall be able to make appointments on lower salaries than have now to be given; and probably as Mr. Browning suggested, in some places it may be possible to arrange that drawing shall be taught by the ordinary staff, preference in appointments and promotion being given to masters competent to teach this subject, and also to appoint less expensive drawing masters, only acquainted with the Vernacular, who hold the Second Grade Certificates of the Jamsetji Jijibhoy School of Art. The Inspector-General of Education will bear this in mind, and meantime efforts should be made to induce Municipalities and local subscribers to provide the necessary funds. I sanction, however, from Provincial funds the appointment of a Drawing Master on R50 for the Mandla Middle

School in recognition of the munificent gift of R63,000 towards the endowment of that school made by a local gentleman, Rai Bahadur Nuna Lal. I commend this example to the notice of the wealthier members of the Native community.

5. As regards the teaching of Science in Middle Departmental Anglo-Vernacular schools and of science and drawing in Primary schools, I sanction the revised curricula of study for Anglo-Hindi and Anglo-Marathi schools submitted by the Inspector-General. A revised curriculum for Uriya schools is awaited. Under these drawing is made compulsory in all Lower Primary schools; optional in Middle schools. I have insisted upon this because it seems to me that the subject should be compulsory until it can be seen whether a boy has a turn for it or not. Afterwards it is mere waste of time to compel lads to practise drawing if they show that they will never make anything of it. We are able to make drawing a compulsory subject in Lower Primary schools, because the subject is taught to the masters through Normal schools. The following extracts from the Schedules will show the course of study in drawing and physical science which will now supplement the ordinary subjects of instruction in our Middle and Primary schools.

## I.—Vernacular Schools in *Hindi Districts.

### *Class I.*

Freehand drawing on slates—Straight lines and their combination, squares, triangles, oblong (compulsory).

### *Class II.*

1. To understand a ground plan of the schoolroom, drawn to scale from measurements taken by the children.
2. Freehand drawing on slates—Straight and curved lines and their combination (compulsory).

### *Class III.*

1. Object lessons—Familiar animals, plants and substances in common use.
2. Free hand drawing on paper, easy freehand copies (compulsory).

### *Class IV.*

1. Object lessons—Second course of familiar animals, plants, and substances in common use and used in manufacture. Lessons of form and colour.
2. Elements of physical science by Mr. Luxmi Shunker Misra to end of 2nd Chapter, *i.e.*, to end of solar system.
3. Freehand drawing on paper—Leaves, flowers from copies (optional).
4. Practical geometry by Burchett—Propositions— 1 to 30 and 33 and 34 (optional).
5. Agriculture—Parts of Mr. Fuller's Agricultural Primer as revised for the Central Provinces.

### *Class V.*

1. Elements of physical science in text-book as above—Definitions; chief forces of nature; gravity and how it acts; the three states of matter; proportion of solids, of liquids, of gases; moving bodies, vibrating bodies; heated bodies; light; the laws of reflection and refraction.
2. Surveying (when practicable).
3. Freehand drawing—Fruits, flowers, etc., from copies; model drawing (optional).
4. Practical Geometry by Burchett, 1 to 30; 33; and 37 (optional).
5. Agriculture—Parts of Mr. Fuller's Primer.

### *Class VI.*

1. Physical science. Revision of fifth class subjects and Chapter on electrified bodies.
2. Surveying (when practicable).
3. Freehand drawing; model drawing; perspective (optional).
4. Practical Geometry 1 to 30, and 33 and 37 (revision) or, if the boys are well grounded, propositions 1 to 105 of Burchett, omitting Nos. 6, 13, 16, 34 to 36, 39, 41, 43 to 46, 48, 50 to 52, 55, 56, 58, 59 and 60 (optional).
5. Agriculture. Revision of previous studies.

## II.—Anglo-Vernacular Primary and Middle Schools.

### *Class I.*

1. Freehand drawing (optional).

### *Class II.*

1. Physical science as in Vernacular curriculum of Class V.
2. Freehand drawing (optional).
3. Practical Geometry as in Vernacular Class V.

* That in Mahrathi districts is on the same general lines save that the Agricultural Primer is begun in the Third.

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*Class III.*

1. Revision in English of Elementary Physical Science and Agricultural Primer, the physical laws involved in some manufacture of the province, gravitation, weights, specific gravity.

2. Freehand and model drawing (optional).

3. Practical Geometry as above. Construction of Ellipse by means of trammel.

4. Surveying when practicable (optional).

*Class IV.*

1. Elementary Physical science. Revision in English. Pump, Barometer, Thermometer Levers, Light, Heat, Electricity.

2. Drawing. Freehand, Model and Perspective (optional).

3. Practical Geometry as in Vernacular Class VI.

4. Surveying when practicable (optional).

6. These curricula will secure a fair amount of book knowledge of elementry physics. It will be necessary to supply apparatus if the Middle school course is to be properly taught. The cost of a set of apparatus for a Middle School will be about R160, and as all save two of these Schools (Katol and Ashti) are in Municipal towns, I must call upon the Municipal Committees to supply this small requirement. At Katol and Ashti the District Councils may be asked to do the same irrespective of the prescribed total of their regular expenditure on education.

7. Arrangements will have to be made for teaching physical science to the masters now employed in Middle (Departmental) Schools. In the Northern Circle I sanction the appointment of a Science Master on R80 a month (inclusive of travelling allowance) for two years to teach, first the Normal School masters at Jubbulpore itself, and then the masters of the different Middle Schools in the circle—giving three months to each school. At the end of that term the masters who pass a qualifying examination will receive certificates from the Circle Inspector; those who fail will not be promoted until they do pass and will be liable to supersession by passed man. When possible arrangements should be made to grant leave in turn to the masters of schools not yet visited, to attend the lectures of the Instructor at neighbouring schools. In this way it might not be necessary for him to visit every school in the circle.

8. Similar arrangements may be made in the Southern Circle. A teacher on R80 per mensem is sanctioned on this account for two years here also.

9. A similar appointment is sanctioned for Raipur for the same period, but the teacher being attached to the Normal School will receive only R70. He will be required to undertake the instruction also of the High School masters and of the Bilaspur teachers of Middle Schools.

10. In Sambalpur the drawing master selected should be capable of teaching physical science.

11. Apparatus at a cost of R270 per set is sanctioned for the teachers at Jubbulpore, Nagpur and Raipur.

12. Surveying with the cross staff and plane table is already taught in some Middle Schools. This should be made more general, and a paper on the theory of surveying should be set as an optional subject in the Middle School examination.

13. Mr. Fuller has very kindly re-written his Agricultural Primer to suit the Central Provinces. This will be translated into Hindi, Marathi and Uriya, nd be made a voluntary subject by the Primary Scholarship examination. Drawing will also be made an optional subject in both Middle and Primary Scholarship examinations. But preference will always be given, when other marks are equal or nearly so, to boys qualified in drawing. The subjects of the examinations will be as shown in an Appendix to this Minute.

14. To encourage the study of drawing and physical science in Middle Schools, I sanction 10 annual prizes (of R5 each) for freehand drawing 10 for geometrical, and 10 for model drawing. Also 30 prizes of R5 each for the best pupils in physical science. These prizes will be awarded on the results of the Middle School examination.

15. To encourage the study of the Agricultural Primer, a special examination for certificates in Agriculture will be held annually in each district, open to all boys who have passed the Upper Primary examination. I recommend the District Councils to grant in addition, say, from 10 to 20 prizes in each district, of R2 each to the most successful candidates: no prize to be given for less than half and no certificate for less than one-third of full marks.

16. To encourage the study of physical science in Vernacular schools there will be a special examination in the subject in each district at the same time as the Primary Scholarship examinations, open to all *bonâ fide* Vernacular school students who have passed the Upper Primary examination, at which certificates will be given to all who get over half of full marks. I recommend District Councils to add to this, say, 10 prizes of R3 each for the best students getting more than half marks.

17. The Upper Primary examination will remain as at present, but passes in Drawing and Agriculture will be specially recorded on the certificates.

18. I am satisfied that sufficient provision is made, or being made for teaching drawing and physical sicence in all Normal Schools; and under the scheme above sanctioned, we ought in three or four years' time to have the elements of physical science thoroughly taught in the majority of our schools, and the teaching of drawing should be spreading more and more widely year by year.

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19. The administration will continue to grant prizes, as at present, to students passing the examinations of the Bombay School of Art. The rules are republished in an appendix.

20. As regards scholarships, the High School scholarships will, when the difference of marks between competitors is less than 10, be preferentially awarded to the students who do best in drawing. Of the 15 Junior College scholarships, 5 will be awarded to those students who having obtained qualifying marks, undertake to pursue their studies at any College of Law, Medicine, or Engineering, or at the Bombay School of Art. The Armstrong Scholarship of Rs. 12 a month tenable for two years at Roorkee or three years at Poona will of course continue on its present footing.

21. So much then for the general encouragement to be given to the study of Science, Agriculture, Drawing, and technical or professional subjects in connection with our ordinary educational arrangements.

22. I come now to consider what can be done directly for the promotion of Technical education in these provinces.

23. I am anxious to establish Law classes in Nagpur and Jubbulpore, open to the students who have passed the F. A. Examination of the University, or who are certified by the Principal of a Government or Aided College or by a Circle Inspector to have a knowledge of English equivalent to the F. A. standard. The fee for attendance would be R3 a month. The staff would consist of two Lecturers in each place on R100 each, and the classes should be affiliated to, and pursue the cirriculum laid down by the University. I am not sure that I can afford at present to sanction such a sum as R400 a month for Law classes, but I am ready to provide at once R100 a month in Nagpur and R100 in Jubbulpore if the other moiety of the cost can be locally raised. I would give special weight to the possession of Law Certificates in making appointments to Extra Assistant Commissionerships and Tahsildarships. I commend this matter to the liberality of the Native gentlemen of Nagpur and Jubbulpore.

24. I have decided to abolish the 12 Stipendiary apprenticeships at present nominally open to candidates for the Public Works Department. They have not been taken advantage of and are practically of no use. There will in future be 10 Technical Studentships available for natives, and 5 for Europeans or Eurasians. The revised rules for regulating these appointments are appended to this Minute. The Manager of the Bengal Nagpur Railway Company has kindly agreed to receive students on these terms. Managers of other lines having workshops in the Central Provinces will be asked if they also will accept lads in the same way. Warora and Umaria Collieries will probably be able to take some of the students.

23. I have decided to open a class for the study of Practical Engineering, designed to train candidates for Lower Subordinate appointments in the Public Works Department, and for employment under Local Bodies, on Wards' estates and the like. The course of study will extend over two years and embrace the following curriculum :—

1.—MATHEMATICS.

1. *Arithmetic* up to the Middle School Standard (Revision).
2. *Trigonometry*—Up to Measurement of angles. (Todhunter's Trigonometry for beginners.
3. *Mensuration*—Lines, surfaces, and solids.

2.—ENGINEERING.

4. Levelling (including contouring).
   Chain surveying.
   Traversing.
   Plane tabling.
5. Drawing. Portions of the Normal School course with drawing of plans and elevations of simple buildings, bridges and culverts.
6. Road making as in the Roorkee Treatise, including setting out of earth-work embanking, cutting and side draining.
7. Brick and tile making, manufacture of lime, mortar, cement, concrete, hydraulic mortars, white and colour wash.
8. Varieties of stone and wood as used for construction.
9. Elements of simple construction.
10. Carpentry.

The Roorkee Text Books will be mainly used throughout the course.

The class will be in charge of a specially selected officer of the Public Works Department who during the working season, will take the pupils out to practical work on the roads or other public works, as the Chief Engineer may direct. He will be assisted by a Maistrie on R50 for practical out-door work. No fees will be charged for attendance on this class, but the pupils must bear all their own travelling expenses. For drawing lessons the pupils will attend at the Normal school and will also be instructed by the Public Works Department Officer in the professional drawing course. They will also be required to attend the Carpentry class of that institution. The class will work in the old tahsil building which will be put in order at once by the Executive Engineer, Nagpur.

26. It has further been arranged with Mr. Fuller to open an agricultural class at the Nagpur Experimental Farm. The syllabus of the proposed course is attached to this Minute.

I sanction the following staff for this class: which will be in charge of Mr. Maha-luxmi-wala, the Superintendent of the Farm:—

| | Monthly. | |
|---|---|---|
| | R | R |
| Allowance to the Superintendent . . . . | 50 | |
| Instructor of Agriculture and Surveying . . . . | 125 rising to | 150. |
| Overseer . . . . . . . . . . . | 40 rising to | 50. |

Apparatus has already been ordered and accommodation for class rooms arranged at the Farm. No fee will be charged at present for attendance. Successful students will be preferred for appointments in the Revenue, Forest, and other suitable Departments.

27. The Inspector-General of Education must arrange for making the opening of these Engineering and Agricultural classes widely known in High and Middle Schools. All scholarships will be tenable at the classes. They will be open to all lads who have passed the Middle School examination, and every effort should be made to secure a good attendance when they open on the 11th of June next.

28. This is all that the funds at my disposal warrant my attempting at present. But if the Native gentlemen of the Provinces are at all interested in its future they will not long leave the scheme undeveloped for want of funds. What we want first of all are funds for the employment of drawing masters in Middle Schools at R50 a school. Then we shall be glad to see money given for technical scholarships and studentships of all descriptions, tenable either at the institutions of this Province or in the more advanced schools and colleges of the older Provinces. Donations for the purchase of apparatus for Middle and to a less extent for Primary Schools would also prove useful.

A. MACKENZIE,

*Chief Commissioner.*

*4th April 1888.*

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## APPENDIX I.

### Middle School Examination.

| | |
|---|---|
| Language and Grammar . . | 1. English.<br>2. A Vernacular language. |
| Mathematics . . . | Arithmetic.<br>Algebra and Mensuration (plane surfaces only).<br>Euclid—26 propositions of Book I.<br>Theory of surveying with Plane Table and Cross Staff (optional). |
| Physical Science . . . | Padarth Vidnyam Vitap or translation of Balfour Stewart's Primer (extent to be notified from time to time). |
| Drawing . . . . | (1) Free hand.<br>(2) Geometrical.<br>(3) Model.<br>Optional, but result to be recorded in certificates. |
| Surveying . . . . | With Plane Table and Cross Staff (optional). |
| General knowledge . . | Geography. |

### Primary Scholarship Examination.

| | |
|---|---|
| Language . . . . | (1) A Vernacular language and Grammar. |
| Geography and History . . | The Geography of the Central Provinces, Outlines of Geography of India and the world; the English period of Indian History. |
| Arithmetic . . . . | (3) Rule of Three; Least Common Multiple; Greatest Common Measure; Addition, Subtraction, Multiplication, and Division of Vulgar Fractions. Addition and Subtraction of Decimals; conversion of Decimals into Vulgar Fractions and the converse; simple questions on the Multiplication and Division of Decimals. Interest. Mental Arithmetic. |
| Sanitation . . . . | (4) The Sanitary Primer. |
| Agriculture . . . . | (5) The Primer—(optional, but results recorded on certificate). |
| Drawing . . . . | (6) Freehand—(optional, but results recorded on certificate). |

## APPENDIX II.

### Bombay School of Art Examination.

The following rules for the encouragement of elementary drawing are published for general information. They have been approved by the Chief Commissioner and apply to all schools except school for Europeans which are aided under a special Code. It will be observed that only schoolmasters who held 2nd or 3rd grade certificates are eligible for the grants of rule 2 and that the payments of rule 1 are only made to registered grant-in-aid schools under private management.

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The value of the 1st grade prize, see rule 4, is R2 for every drawing which reaches the standard of "excellence." The value of the 2nd grade prize will be R4 for every drawing which reaches the standard of "excellence." Thus, *vide* rule 6, a candidate may take possible prizes of the value of R6 in the 1st grade and, *vide* rule 10, possible prizes of R20 in the second grade. The number of intending candidates in English, in each vernacular, for the 1st and 2nd grade drawing prizes and certificates must be sent to the Principal Sir Jamsetjee Jijibhoy School of Art, Bombay, annually, before the 15th March.

The examination papers for all candidates will be prepared at the Jamsetjee Jijibhoy School of Art.

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## RULES FOR THE ENCOURAGEMENT OF ELEMENTARY DRAWING.

1. * Payments may be made on the results of the Annual Examination in Drawing of pupils and of pupil-teachers in grant-in-aid schools under private management as follows :—

| | *R* | *a.* | |
|---|---|---|---|
| (*a*) | 0 | 8 | For every exercise of the 1st grade marked "*Fair*" |
| (*b*) | 1 | 0 | For every exercise of the 1st grade marked "*Good*" |
| (*c*) | 2 | 0 | For every exercise of the 1st grade marked "*Excellent.*" |
| (*d*) | 5 | 0 | For every exercise of the 2nd grade in which a pupil passes. |

2. Schoolmasters and pupil-teachers in all schools and colleges who hold Second Grade Art Certificates and who teach drawing in their own schools shall receive an annual grant of R(100) one hundred, provided that not less than ten of their pupils take off the 1st grade certificate. On the same conditions the same grant may be given on account of any drawing master teaching in a large school or in a group of schools. And the grant shall be R150 in case the teacher holds the 3rd grade certificate of the School of Art.

3. The following rules apply to all schools and colleges in the Central Provinces at which drawing is taught.

4. *Prizes and certificates.*—A prize will be given for every drawing of the 1st or 2nd grade which reaches the standard of excellence, and a certificate to every pupil who passes in all the subjects of the 1st or 2nd grade.

First grade prizes are usually only given to pupils under 18 years of age. In training schools the pupils may be of any age.

5. Examinations in 1st and 2nd grade for the purpose of awarding prizes and certificates shall be held annually in April.

6. The subjects forming the 1st grade are :—

(*a*) Simple free-hand drawing.

(*b*) Simple model and object drawing.

(*c*) Practical geometry.

### A.—First Grade simple Free-hand Drawing.

By simple free-hand drawing is meant drawing without the aid of any kind of mechanical means of execution, such as ruling, measuring or tracing; or the use of anything but pencil, paper (or slates) and India rubber.

The examples used should be characterized by simplicity and beauty of outline, and should be the subject of a flower, leaf, fruit or some simple object with which the pupils are acquainted.

### B.—First Grade Model Drawing.

By model drawing is meant drawing in outline from some simple object arranged so that the pupils may have to draw both curved and straight lines. Indian pottery, brass utensils, Surat toys form admirable examples for this subject.

### C.—Practical Geometry.

This stage is intended to teach elementary notions of practical geometry and the use of simple drawing instruments. The examination in this subject will be based on problems 1 to 30 and 33 and 37 of Burchett's Practical Geometry, and the construction of the ellipse by means of the trammel.

7. Not less than three lessons a week of one hour's duration each must be given to the teaching of 1st grade Art.

8. Scholars must be presented for the three subjects of the 1st grade at one examination, but scholars who have failed in any one subject may be presented again for that subject at the next annual examination.

9. No pupil is eligible for examination in any subject of the 2nd grade who has not passed in all the subjects of the 1st grade.

10. The subjects comprised in the 2nd grade course are :—

(*a*) Free-hand drawing from flat examples.

(*b*) Free-hand drawing from models.

(*c*) Practical geometry.

(*d*) Linear perspective.

(*e*) Delineation of diagrams on the black board.

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* These payments are made only on scholars in grant-in-aid schools. Payments *a*, *b* and *c* are made only on scholars under 18 years of age.

11. Pupils for 2nd grade Art certificates must be prepared to—

(*a*) Draw in a given time an example in outline from the flat.

(*b*) Draw in outline a group of models placed by the examiners.

(*c*) Solve on paper questions in geometry showing a knowledge of the construction of figures up to problem 105 of Burchett's Geometry, omitting the following:—

Nos. 6, 13, 16, 34, 35, 36, 39, 41, 43, 44, 45, 46, 48, 50, 51, 52, 55, 56, 58, 59 and 60.

(*d*) Solve questions in perspective showing the use of vanishing and measuring points used in horizontal planes, and to represent simple solids on the ground plane in any position.

(*e*) Instruct a class in the presence of the examiners by an example drawn on the black board.*

12. A pupil may be examined in any one subject of the 2nd grade at a time, but a specimen work of the subject (in which he or she wishes to be examined) must be sent up to the School of Art, Bombay, by the 15th of March and must be approved before he or she can be admitted to the annual examination.

13. The specimen works are:—

(*a*) A sheet of free-hand outline drawing from flat examples.

(*b*) A drawing from a group of models in outline.

(*c*) A sheet of no less than six geometrical problems.

(*d*) A perspective diagram.

The above works must be executed on imperial sheets of paper.

14. A pupil who has once passed in a subject may not be examined again in that subject.

## APPENDIX III.

### RULES FOR TECHNICAL STUDENTSHIPS IN THE CENTRAL PROVINCES.

(1) The Chief Commissioner has established fifteen technical studentships, of which ten are for natives, who must have attended at some school in the Central Provinces for two years before appointment, and five are for Europeans or Eurasians who have attended a school in the Central Provinces for at least two years previous to appointment, or whose near relatives are domiciled in the Central Provinces.

(2) No boy will be appointed to a technical studentship after he has passed sixteen years of age.

(3) No Native will be appointed to a technical studentship, who has not passed the Middle School examination.

(4) No European or Eurasian will be appointed to a technical studentship who has not passed by the 6th Standard prescribed in the Code of Regulations for European schools in the Central Provinces.

(5) Subject to the above conditions the studentships will be awarded to the best scholars, namely, to those Europeans and Eurasians who pass highest in the 6th or Higher Standard or who have matriculated, and to those native scholars who pass highest in the Middle School or higher examination.

(6) The selected students will be medically examined by the Civil Surgeon of the station in which they reside, and, if passed by him, will be attached to a workshop on probation for the first three months, and at the end of that time will be accepted as students if their conduct and aptitude for the work are considered satisfactory.

(7) The parent or guardian of each student must sign an agreement that the student will be provided by him with food, clothes, lodging, washing, and all necessaries without any charge to the Manager of the workshop to which the student may be attached, and shall be received back by him without demur if the Manager finds that the student is not making progress or ought, for other reasons, to be discharged.

(8) During the two years of his studentship each student shall receive a stipend, if a Native of India, of R8 per mensem, if a Eurasian, of R10 per mensem, if a European, of R15 per mensem, subject to such deductions for irregularity in attendance, for great carelessness or other misconduct, as the Manager of the workshop may direct.

In case of gross misconduct or inefficiency the stipend may be withdrawn altogether by order of the Chief Commissioner.

(9) After two years the student's stipend shall ordinarily cease, unless for special reasons the Chief Commissioner allows it to be continued. The student will then be expected to earn wages sufficient to support himself but he will have no claim to employment either on the Government or on the Manager of the workshop. Deserving students might however expect to be retained.

* Subject (*e*) is only for those intending to become teachers of drawing and the examination in this subject will be held in Bombay only.

*N.B.*—Examination papers will be prepared at the J. J. School of Art, Bombay, and the examination will take place on a fixed day at convenient centres. The Government Inspectors will prepare lists of pupils to be examined; receive, distribute and collect the examination papers; and forward the work of the candidates to the School of Art for disposal.

(2) Marathi and Guzarathi translations of Burchett's Practical Geometry can be obtained from the Government Central Book Depôt, and translations of the book are being prepared in Kanarese and Sindhi.

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(10) Each student will be trained as a mechanic. Those who exhibit a talent for drawing will be further trained as draftsmen. Those who show no aptitude for drawing, or for the higher branches of practical mechanics, will be trained to be firemen and thereafterdrivers.

(11) Candidates for studentships must apply to the Inspector-General of Education not later than two months after the annual Middle School examination, if Natives, or after the annual examination of their school, if Europeans or Eurasians. Applications must be accompanied by certificates of age, birth-place and character signed by the last schoolmaster of the candidate or by two respectable householders of the town in which the candidate lives.

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A.

## FORM OF APPLICATION.*

(FOR EUROPEANS OR EURASIANS).

I, the undersigned (1)__________ a resident ______ Tahsil ______ District ______ being the (2)______ of ______ the son of ______ a resident of ______ hereby apply for permission for the said ______ to become a candidate for admission to a technical studentship.

(1) Name and occupation.
(2) State relationship.

The said ______ was born to the best of my information and belief on the ______ day of ______ 18 A. D.

I hereby acknowledge that I have received a copy of the conditions on which this application may be granted, and understand that if this application be granted, it will be granted subject to the said conditions.

Signed ______

* By parent or guardian of the boy.

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B.

## FORM OF APPLICATION.*

(FOR NATIVES.)

I, the undersigned (1)______ son of ______ caste ______ a resident of ______ Tahsil ______ District ______ being the (2)______ of ______ the son of ______ caste ______ a resident of ______ hereby apply for permission for the said ______ to become a candidate for admission to a technical studentship.

(1) Name and occupation.
(2) State relationship.

The said ______ was born to the best of my information and belief on the ______ day of ______ corresponding to the ______ day of ______ 18 A. D.

I hereby acknowledge that I have received a copy of the conditions on which this application may be granted, and understand that if this application be granted, it will be granted subject to the said conditions.

Signed ______
the son of ______

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# APPENDIX IV.

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## SYLLABUS OF STUDIES FOR A TWO YEARS' COURSE OF INSTRUCTION IN PRACTICAL AGRICULTURE.

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### A.—AGRICULTURE.

SOILS (*First year*)—Origin of soils; soils *in situ* and alluvial soils; description of principal soils of the Central Provinces with names and qualities; classification of soils by mechanical analysis; fertility of soils as dependent on composition, texture, depth and lie of surface; effect of climate in improving soils; improvement of soils by levelling and by embankment; cost of these processes.

* By parent or guardian of the boy.

(*Second year*)—Physical properties of soils; their absorbent and evaporative powers; capillary action; chemical composition of soils considered with reference to supply of the more important plant food elements; the use and abuse of soil analysis; soil analysis by cropping (Ville's method); dormant and active condition of plant food elements; effect of climate and of tillage in converting plant food from the dormant to the active condition; loss of plant food by surface scouring; the exhaustion of soils; its signs and its causes; uses and methods of following; rotation of crops.

TILLAGE (*First year*)—Objects to be attained; influence of climate in assisting and obstructing tillage; use of a fine tilth; the conditions in which different soils are suitable for sowing; different systems of tillage instanced by the systems followed for wheat, for juari, for sugarcane and for rice; implements used for tillage; the nagar in its different forms, the bakhar, the cold crusher English ploughs and harrows.

(*Second year*)—The history of the plough; the theory and method of adjusting the English plough; the material used for various implements and the method of their construction; special operations of tillage for breaking up waste land or eradicating grass; the advantages and dangers of deep ploughing; the effect of embanking land in lessening the need of tillage, the cost of the various operations of tillage.

SOWING (*First year*)—The condition in which land is fit for sowing; methods of sowing practised with different crops; the nari plough, tifans, the argara; broadcast sowing; the depths to which different seeds should be sown; thick and thin sowing; English drills; the growth of seedlings for transplantation; the advantages of transplanting.

(*Second year*)—The vitality of seeds and means of ascertaining whether seed has retained its vitality or not; special preparation of seed for sowing; use of sulphuric acid for cotton; pickling seed; improvement of seed by special cultivation and selection; the principles to be followed in selecting seed; the use of changing seed; special treatments in preparing seed beds for the growth of seedlings for transplantation; cost of sowing and transplanting.

MANURE (*First year*)—The need of applying manures; exhaustion of soils by continuous cropping; soils which give and do not give good returns for manuring; descriptions of manure used by the people and the method of their application; cattle dung, the best method of storing it; the condition in which it should be applied the seasons for its application; green soiling; bones, the manufacture of bone meal; salt-petre; town sewage.

(*Second year*)—Manures considered in relation to plant food; the particular plant foods supplied by different manures; suiting the manure s to the requirements of the soil; the changes occurring in manure pits and the means of regulating them so as to prevent loss of value; the method of making bone superphosphate; the theory of green soiling and of growing crops in a mixture; use of slaked and unslaked lime and gypsum; the various methods of utilizing town sewage in agriculture; the cost of various manures and of applying them.

IRRIGATION (*First year*)—The crops for which irrigation is needed; monsoon irrigation of rice; cold weather irrigation of wheat, vegetables and sugarcane; different methods of lifting water; the well bucket, the Persian wheels, the lever lift, the swing bucket, pumps, kacha and pucka wells; the means of irrigating from streams and nallas; the irrigation of rice and sugercane from tanks.

(*Second year*)—The extent to which water enters into the composition of plants; use of water as a carrier of plant food; sources from which plants derive their water-supply; the rainfall; the retention of moisture by different soils; the depths from which plants can draw sub-soil moisture; the circumstances which render irrigation necessary; its use in distributing the supply from rainfall rather than in adding to it; the method of constructing different water-lifts and their cost; the construction of pucka and kacha wells; the method of lining kacha wells; the places favourable for well construction; the construction or tanks and the places favourable for their construction; the methods of roughly testing discharges and ascertaining the efficiency of different means of lifting water; surface and under-ground drainage, natural and artificial.

PROCESSES INTERMEDIATE BETWEEN SOWING AND REAPING (*First year*)—Weeding; the names and characters of the principal weeds; the injury which weeds cause to crops; the importance of not permitting weeds to seed. Weeding by hand and by bullock power; the daura and dundia; cost of weeding; saving of weeding by good tillage; importance of keeping the ground open round the roots of growing plants in order to check evaporation.

(*Second year*)—Increasing the yield of crops by checking their growth; topping cotton; the "beasi" of Chhattisgarh; watching crops; methods of scaring animals; cost of watching cheap methods of fencing; means of trapping noxious animals.

GATHERING AND CLEANING (*First year*)—The harvesting of juari, til, wheat and linseed; the means of threshing and cleaning them used by the people contrasted with threshing and winnowing machines; the importance of proper cleaning; the meaning of "refraction" in trade.

(*Second year*)—The harvesting of rice, cotton, sugarcane and tobacco; rice cleaning, cotton ginning, sugar boiling and tobacco curing; the manufacture of drained sugar.

GENERAL (*First year*)—The Indian seasons and the crops which grow in them: the effect of heat and cold, moisture, drought and cloudy weather in different crops; crop diseases; rust ergot and caterpillars.

(*Second year*)—The principal crops grown in the Central Provinces; the habits of growth of their roots and stems and their effects in cleaning land, enriching or impoverishing it; the amount of each principal plant food contained in a crop of wheat, and the sources from which it obtains these foods; the part played by the atmosphere in the nutrition of plants; carbonic acid, its presence in the air and its fixation by plants; the ammonia received by the soil in rain; Nessler's tests; nature of fungoid disease as shown by the microscope.

CULTIVATION OF SPECIAL CROPS.—Students will be practically taught to grow and prepare for market the following crops:—

(*First year*)—Juari, til, wheat and linseed.

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(*Second year*)—Cotton, rice, sugarcane, tobacco, garden crops.

FEEDING AND CARE OF STOCK (*First year*)—The food to be given to cattle in work and out of work; importance of a mixed diet; advantage of giving salt; injury resulting from sudden change from dry to green food; the comparative advantages of grazing and stall feeding; the growth of fodder crops, popat, lakholi, guinea grass.

(*Second year*)—The chief breeds of cattle found in the Central Provinces; the best methods of housing cattle and preserving their manure; the use of the chaff cutter; ensilage; the comparative merits of cotton seed, karbi, wheat straw, rice straw and pulses as cattle food; the influence of these foods on the value of cattle dung as manure.

FRUIT GROWING (*First year*)—The methods of sowing and transplanting mangoes, oranges, plantains and guavas.

(*Second year*)—Grafting and budding.

B.—ELEMENTARY CHEMISTRY.

(*First year*)—The resolution and formation of simple compounds; character of the elements, preparation and properties of oxygen, nitrogen, hydrogen and chlorin; the properties of carbon, sulphur, and the best known metals and their occurrence in nature.

(*Second year*)—The character of phosphorus, potassium and sodium; the properties of the following acids,—nitric acid, hydrochloric acid, carbonic acid, sulphuric acid, phosphoric acid, and of the following bases,—lime, potash, soda and ammonia; composition of water and of air; use of simple chemical tests and reagents; the functions played by starch, sugar and gluten (or albumen) and the main points of difference in their composition; the formation of saltpetre.

C.—ELEMENTARY GEOLOGY.

(*First year*)—The characteristic of different kinds of rocks, trap, laterite, standstone, limestone; method of their formation; the action of seas, river, and volcanoes; the formation of soils from rocks by disintegration and denudation; the origin of black soil.

(*Second year*)—The age of rocks as evidenced by fossils; the formation of coal and of beds or veins of minerals and ores; the origin of underground springs.

D.—ELEMENTARY BOTANY.

(*First year*)—The structure of a typical plant; the more obvious uses of its different parts, the parts on account of which different plants are cultivated and the development which cultivation has brought about in these parts; different well known forms of roots and leaves; the structure of plants of the following typical orders,—Leguminosæ, Malvaceæ and Cucurbitaceæ.

(*Second year*)—Cells, their forms, composition and contents; cell growth; functions of roots, selection and absorption of food and storing of nutriment; structure of stems and leaves and their functions; transpiration and assimilation; functions of the flower; structure of the fruit and seed; the formation and development of the following fruits and seeds, the orange, the guava, the mulberry, the fig, cotton pod, the cucumber and the pea; the structure of plants of the following natural orders,—Compositæ Umbelliferæ, Urticaceæ and Gramineæ.

E.—LAND SURVEYING.

(*First year*)—Plotting to scale; map drawing and clouring and the use of conventional signs; chain surveying by triangles and by sight rule; survey by intersection; calculation of areas by mensuration and by acre comb.

(*Second year*)—Use of the theodolite and chain in traversing; Gale's method of plotting a traverse; proving a traverse and calculation of areas by universal theorem; use of the planimeter, proportional compasses and pentagraph.

F.—DRAWING.

Free hand.

G.—VETERINARY SCIENCE.

The Elements.

## *No. 13 (a.)—Letter from the Chief Commissioner* re *the report on technical education.*

No. B (a), No. 5474—299, dated Nagpur, 27th November 1886.

From—F. C. ANDERSON, Esq., Officiating Secretary to the Chief Commissioner of the Central Provinces,
To—The Inspector General of Education, Central Provinces.

I AM directed to thank you for the information contained in your preliminary report, No. 10203, dated 23rd ultimo, on the subject of technical education, and to communicate the Officiating Chief Commissioner's observations and orders thereon.

2. In the third paragraph of your report you state that you have written to the Superintendents of the Schools of Art, Madras and Bombay, and have asked them whether they can recommend any teachers of drawing for the schools in the Central Provinces, also what pay they should get. In the event of good masters being obtained, you propose to attach one to each of the High Schools Jubbulpore, Raipur, Sambalpur, and Saugor, to give instruction in drawing to such of the students as have a taste for the subject, and who may wish hereafter to qualify in engineering or as draughtsmen.

You add that as funds permit and masters are obtained, you propose to introduce drawing into middle and selected primary schools, but that you do not propose to make drawing compulsory in any schools. I am to invite a reference to paragraph 5 of this office letter No. 5202—299, dated 13th instant, in which it is said that the Officiating Chief Commissioner is inclined to think that drawing of the most elementary kind might with advantage be made compulsory on the lowest classes, though he would not make it compulsory on the higher classes in our schools; and to add that Mr. FitzPatrick reserves his opinion on this point. In other respects, however, he agrees to your proposals with regard to the introduction of drawing.



3. In regard to the fourth paragraph of your report, I am to state that the Officiating Chief Commissioner is glad to hear that all the College and High School scholarships in the Central Provinces are tenable without any special sanction at any Engineering College or Medical College.

4. As regards paragraph 5, I am to state that Colonel Ward has been informed demi-officially that, had he consulted you in the first instance, you would probably have been able to supply the Public Works Department with the services of a competent draughtsman, and that in fact when you did on one occasion send a man, you were told that the candidate was rather too good for the Public Works Department and was not exactly the kind of man required.

5. With reference to the seventh paragraph of your report, I am to request that you will be good enough to ascertain from the Conservator of Forests, Central Provinces, and report to this office the result of the action taken in respect to the scholars sent to him to be trained in forestry.

6. In conclusion, I am to state that the final report promised on the subject of technical education in these Provinces will be awaited by the Officiating Chief Commissioner.

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## *No. 13 (b).—Note on drawing by the Inspector General of Education.*

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No. 10208, dated the 23rd October 1886.

From—The Inspector General of Education, Central Provinces,

To—The Secretary to the Chief Commissioner, Central Provinces.

I have the honour to acknowledge the receipt of your No. 4692—288 of 14th October requesting me, after consulting certain officers and native gentlemen who take interest in education, to report on the subject of technical education in India; and in paragraph 3 of the letter I am asked to state "exactly how matters stand at this moment with regard to the introduction of drawing into schools," and to mention what I would now propose to do " in this and other respects." I conclude, therefore, that, while I am only to report on the subject of the note issued by the Government of India, of its applicability to schools in these Provinces, and to make "definite, detailed and as far as possible fully worked out suggestions," after I have consulted the officers and bodies named, yet I am now to say how matters stand with regard to the introduction of drawing, and to make definite proposals.

2. In reply, I would mention that some years ago two students were selected and sent to be trained at the Sir Jamsetji Jijibhoy School of Art. Unfortunately their mother tongue was not Marathi and they knew no English. Their progress was very slow: one after trial I found entirely inefficient as a Drawing Master; the other is now employed in the Normal School, Jubbulpore, and teaches drawing to the students. He is not good. In Nagpur, we have in the Normal School Mr. Waman Krishna Hardikar who has a 2nd grade Jamsetji Jijibhoy School of Art certificate, Bombay, and who instructs such of the pupils as have a taste for drawing. In 1884-85, two students obtained 1st grade Art certificates from Bombay, and five obtained prizes. Recently, three other students obtained Art certificates and will proceed with scholarships to the School of Art, Bombay, so soon as the Superintendent says that he is ready to receive them. The mother tongue of these students is Marathi, so there will be no difficulty in their instruction in Bombay. We have already in the School of Art one scholar, Govind NarayanVele, who having passed the 1st grade is studying for the higher grade, and is doing well, I think, so far as I can judge from his drawings and from the remarks passed on them by his teachers. On his qualifying he will be appointed to Jubbulpore in place of the present master, who is not very competent, and who will be sent to some less important school. At present, then, we teach drawing, in two of our training schools to such students as have a taste for drawing, and in the last two years we have passed fiive students by the 1st grade, have sent three selected students to Bombay for further instruction, and when they return instructed they will be appointed to teach drawing in schools in the Marathi-speaking districts.

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3. I have just written to the Superintendents of the Schools of Art, Madras and Bombay, and have asked them whether they can recommend any teachers for our schools and what pay they would propose that we should give them. If I can obtain good masters I propose to attach one to each of the High Schools of Jubbulpore, Raipur, Sambalpur and Saugor to give instruction in drawing to such of the students as have a taste for the subject, and who may wish hereafter to qualify in engineering or as draughtsmen. I believe the Municipalities in some, if not in all, of these places will assist with the necessary funds. As funds permit, as masters are obtained, drawing will be introduced into our middle schools and into selected primary schools. It is not proposed to make drawing compulsory in any schools. The "Note" that you have been good enough to send me is valuable, inasmuch as it proposes to encourage drawing in primary and secondary schools. But even so, I think it was an error to seek to make instruction in drawing compulsory, to make the acquirement of the Art universal. If the writer of the Note had visited drawing classes and schools in Europe, he would have found that those attending them were either some of the well-to-do classes of the community, or mechanics, artisans, engineers, boat-builders, ship wrights, workers in metal, designers, architects, masons, stone-cutters, carpenters, etc., to whom a knowledge of drawing was either absolutely necessary or at least largely advantageous. A man training as a musician would not usually attend a drawing class, nor would a clerk attend, nor a medical man, nor a banker, nor a retail shop keeper, except indeed any or all such persons had a taste for drawing. As a general instrument of education, the use of drawing has been over-rated; for special purposes it is invaluable, but as an universal and compulsory instrument of education, it would be harmful, as it would be simply a waste of time to teach drawing to students without aptitude, and to whom in after-life the little they learnt could not possibly be of any practical value as compared with the things they neglected in order to pay an enforced attention to drawing. I do not discuss "the Note" here; that discussion is reserved until I have consulted the officers mentioned by you and am able to take up all the points mentioned in the "Note."

4. I think, however, the Chief Commissioner would like me to mention, with regard to paragraph 5 of letter No. 4692—288, that all our College and High School scholarships are tenable without any special sanction at any Engineering College or Medical College; that we have had really distinguished students in the Engineering College, Poona. At least two are now Assistant Engineers, one in Bombay and one in these Provinces, Mr. Dhondu Sakharam Sathye, 2nd grade Assistant. So also for the higher branch of medical education, at least one of our students attended the Medical College, Calcutta, and received a scholarship. There is no reason why any student that chooses should not with his scholarship attend a Medical College and study for his degree. No fixed proportion of scholarships is assigned to Art students. When a student has received a good general education, as tested by the Middle School Examination for some occupation —as tested by the Entrance examination for other professions—he can join any college whether to study medicine or to study engineering or agriculture or whatever he likes. We simply do not compel him to study these subjects. He chooses for himself. So also with reference to paragraph 7, our Middle School Examination is accepted as a test for entrance to the Patna Medical School (see page 432, Part IV, of the last issue of the *Central Provinces Gazette*).

5. With reference to paragraph 9, I would mention that I have done everything I can to make the technical scholarships known. Their rules were published in the *Central Provinces Gazette* and in my annual report, and were sent to all the officers noted in the margin.

Reverend F. Pelvat, Saint Francis DeSales, Nagpur.
Reverend F. Delalex, Saint Aloysius, Jubbulpore, Head Master, Bishop's School.
*All* Zila Inspectors.
*All* Head Masters for Zila School and High Schools.
Reverend G. Anderson, Seoni.
Reverend J. P. Ellwood, Jubbulpore.
Head Master, Christ Church Boys' School, Jubbulpore.
The Principal, Jubbulpore College.
*All* Circle Inspectors of Schools.
Reverend J. G. Cooper.

No pains were spared to make the rules widely known. As regards the services of a drughtsman wanted by the Public Works Department, perhaps, if I had been asked, I might have sent a man. I did send a man once, and if I remember rightly, I was told the candidate was rather too good for the Public Works Department, not exactly what was required in fact. He is now studying in Bombay.

6. With reference to paragraph 14, I would add that we use no agricultural primer in any of our schools. Such a book has soils to be written. The soils, crops, and methods of cultivation are very various. Processes suitable for Chhindwara and Betul would be absurd in Nagpur and Chhattisgarh. Crops and processes suitable for the Nerbudda valley would hardly do for Wardha and Chanda. This is self-evident. I have not introduced any agricultural text-book, as a suitable book is still a desideratum. In India agriculture follows rather narrow lines; on those lines, and with the means at the ryot's disposal, we have little we can teach him. We have got an agricultural department. That department may for the next 20 years make a series of experiments in cultivation with various staples, various soils, various climates, various manures, various, implements, etc., but always with regard to the necessarily limited conditions under which agriculture in India must be carried on owing to the want of capital. Then, after a long course of experiment, carried on through a long course of years without any regard to resulting profit, we shall have acquired experience and information which we now want, but which will then be capable of being imparted to students in schools of agriculture to be hereafter established.

7. With reference to paragraph 16, I would mention that I have frequently sent scholars to the Conservator of Forests to be trained in forestry.

8 My object is not to discuss the "Note," but simply to say "how matters stand at this moment" with regard to drawing, and to mention circumstances which perhaps are not known to the Chief Commissioner. Your letter No. 4692—288 hardly gives credit, I think, to these Provinces for what has already been done.

No. 13 (c). Industries in the CENTRAL PROVINCES, 1889.

# *No. 13 (c).—Letter* re *Industrial survey from the Chief Commissioner to the Government of India.*

No. $\frac{7002}{364}$, dated the 30th November 1888.

From—A. L. SAUNDERS, Esq., C.S., Under Secretary to the Chief Commissioner, Central Provinces,
To—The Secretary to the Government of India, Home Department.

I am directed to acknowledge the receipt of Mr. Edgerley's letter No. $\frac{14}{462}$, dated the 2nd instant, enquiring what action has been taken in the Central Provinces towards carrying out the suggestion for the completion of an Industrial Survey, made in Home Department Resolution No. 199, dated the 18th June last, on Sir Alfred Crofts' Report on the state and progress of education throughout British India.

2. In reply, I am to say that the enquiry has been entrusted to the Inspector-General of Education and the Commissioner of Settlements and Agriculture, Central Provinces, jointly, and that the question is under reference from them to District Officers.

3. I am to add, however, that in this Province, which is wholly agricultural, there are as yet hardly any industries to survey beyond the common village trades.

# *No. 13 (d).—Joint Report on the Industries in the Central Provinces.*

No. $\frac{3429}{147}$, dated the 4th June 1889.

From—L. K. LAURIE, Esq., C.S., Officiating Secretary to the Chief Commissioner, Central Provinces,
To—The Secretary to the Government of India, Home Department.

In continuation of this Administration's letter No. 7002-364 of the 30th November last, I am directed to forward, for the information of the Government of India, the accompanying copy of a Joint Report prepared, at the Chief Commissioner's request, by the Inspector-General of Education and the Commissioner of Settlements and Agriculture, on the subject of the existing industries of these Provinces and the possibility of encouraging them by appropriate technical education.

2. The Government of India, in paragraphs 22—25 of its Resolution No. 199 of the 18th June 1888, discriminates between "preliminary" technical education and the special work of the Technical Institute or Industrial College. The former kind of education is recognized as a branch of general education, calculated to correct the too literary style of the ordinary Indian curriculum, as well as to prepare the student for the special training of practical technical schools. The latter is described as having its *raison d'être* only in direct local connection with existing centralised industries. It was in view to considering the establishment of special technical schools of the latter description that an Industrial survey was suggested, in order to discover those centralised industries which could best be developed and stimulated by the opening of schools of this class.

3. The survey has been made in the Central Provinces, and the results are embodied in the Report now submitted. As might easily have been foretold, centralised industries are non-existent in this agricultural area. What few town-industries there were in the Province in former days have been crushed out by European competition, or by change of conditions, and are past revival. They were never at any time of marked importance.

4. It is quite true, as the Reporters remark, that these Provinces are singularly deficient even in professors of the ordinary handicrafts of daily life. But the Chief Commissioner has confidence that this state of things will improve, as has been the case elsewhere. The demand caused by the opening out of the Province by Railways will create the supply. Many of the artizans who are now being imported in large numbers will settle here and will teach their craft to others.

5. The suggestion that District Councils and Municipalities should establish Technical scholarships in connection with Railway workshops in order to increase the supply of artizans, is not feasible. In the first place, the local bodies have not funds enough for the general primary education which it is their first duty to extend—and in the next place the Railways do not want, and will not take, these apprentices in any large numbers. Mr. Mackenzie had great difficulty in finding places for as many as 15 technical students whom the Provincial funds support.

6. The Chief Commissioner accepts the general conclusion of the Reporters that there is no room at present in these Provinces for *special technical schools* in connection with *centralised industries*. He has already opened special schools of Agriculture and Engineering. It remains to be seen whether these will live and develope. At present the results, especially in the Agricultural class, are very promising. The Technical studentships for mechanical Engineers are also beginning to attract candidates, but are still not all taken up.

7. Turning now to general preparatory technical education, the Chief Commissioner does not see that more is now possible than is being done. Drawing has been made a universal subject. It is now taught in all High and Middle schools, and is being started in Primary schools as fast as the

masters can be trained. The elements of physical science have also been introduced. The Educational Department is doing all it can to train and improve the teachers, and is introducing the Kindergarten system for the lower classes. Carpentry classes are attached to 14 schools—not with a view to making carpenters, but to train hand and eye, and teach the use of tools as a part of general education. If under recent orders for their management they show good results, they may well be extended.

8. The Chief Commissioner did what he could to get the Morris College converted into a Technical Institute, but the shortsighted prejudices of the Mahratta Brahmins on the management frustrated the scheme. He is not prepared to accept the Committee's suggestion to found a Science and Arts College at Government expense. As matters stand at present, there would be no students unless they were bribed heavily to attend. The classes already started meet all existing wants.

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## JOINT REPORT.

No. D—1292, dated the 22nd April 1889.

From—ALEXANDER MONRO, Esq., M.A., B.C.L., Barrister-at-Law, Inspector-General of Education, Central Provinces, and J. P. GOODRIDGE, Esq., C.S., Officiating Commissioner of Settlements and Agriculture, Central Provinces,

To—The Secretary to the Chief Commissioner, Central Provinces.

With reference to your letter No. 2140-221, dated the 28th August 1888, paragraph 4, we have the honour to submit the following report.

2. On receipt of your letter, a circular letter was addressed to the Deputy Commissioners, asking for information regarding the different industries practised in their districts, and the Inspector-General of Education under took, during his cold weather tour, which extended over 16 districts, to institute enquiries into the state of these industries. The following information is the result of these enquiries.

3. The appended table, taken from the last Census report, gives the number of persons engaged in the different industries in these Provinces. The population of the Provinces being 11,548,511, and the number of such persons being 1,353,717, the proportion which the latter bears to the former is 12 per cent. These figures can, however, only be taken as approximately correct, as caste is, in many cases, confused with occupation.

4. The principal industries practised in these Provinces, apart from carpentry and blacksmiths work, handicraftsmen in which, though of very inferior skill, are to be found in almost every large village are as follows :—

### (1) CARVED WOOD WORK.

It has been said that this is, perhaps, the only art in which these Provinces can hold their own against other parts of India. Specimens of carved wood work of great beauty and excellence of design, made at Nagpur, were sent to the Colonial and Indian Exhibitions, and were much admired. It is not an uncommon thing to find, even in small villages, houses with carved teak fronts and pillars displaying marked taste and skill. The carved wood frontages in Gadarwara, made by a carpenter from Saugor, are specially deserving of notice. The art is, however, dying out, owing to an absence of demand. The style of house now built by well-to-do natives is more after the European fashion, and consists of durable structures of stone, with fewer wooden verandahs and balconies, and therefore a less number of pillars, carvings and fret-work. Iron, too, in these days when good timber is so expensive, is taking the place of wood. The wood carvers' field is, therefore, being gradually diminished, and the art is not likely to be revived. In some large houses recently built by wealthy natives, but few embellishments in wood are observed. The skilled carver having lost his chief patron, the native Raja, has no scope for his genius and is now rarely met with.

### (2) GOLD AND SILVER WORK.

Gold necklets of a peculiar kind are made at Sambalpur. They are rough in execution. They are worn principally by Brahmin youths, being supposed to possess the virtues of an amulet. Chanda was, in former years, famous for gold and silver work, but the industry seems entirely to have perished, as no specimens were sent to the Indian and Colonial Exhibition.

### (3) BRASS AND COPPER WORK.

Brass utensils were, at one time, largely made in many parts of the Central Provinces—especially at Bhandara, Lodhikhera, Timorni, Mandla and Sambalpur. Mandla is still celebrated for the manufacture of bell-metal vessels. The brass and copper articles manufactured in these Provinces consist mainly of household utensils, without much pretension to artistic merit. All of these industries have declined since the extension of the Railway to Nagpur, and the introduction of rolled brass sheets from Bombay. It is said, that at one time, there were no fewer than 200 working firms in Bhandara alone, while, at present, there are only some fifty or sixty. Formerly, a large number of workmen were engaged in smelting and beating out the metal into sheets. Many are, now, out of employment, the sheets being imported ready-made. Brass lamps of rough workmanship are made at Jabera in the Jubbulpore District. The cost of working, according to the native method, in bell-metal is so great that its use has been largely superseded by making brass vessels from rolled brass sheets. Only the well-to-do can afford to buy fancy articles made of this metal. There is no hope of the extension of this industry, which is, at present, quite unimportant. Some ingenious and quaint images of idols and animals are made of brass in the Sambalpur District, and find a ready sale among the rich, but they exhibit but little artistic skill and aptitude.

(4) ARMS AND ARMOUR.

The town of Nagpur formerly enjoyed a reputation for its swords, hog-spears and daggers made from steel brought from the valley of the Narbada and the Tapti. The industry is now extinct, and the only artizan left has taken to the manufacture of cutlery. The Saugor District, once, had a great name for its gun barrels, but the use of cheap European fire-arms has so entirely superseded the old native arquebuss and musket, that the industry is now almost, if not quite extinct.

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(5) CUTLERY.

As above stated, cutlery is made at Nagpur by an artizan, who has abandoned the trade of making arms. Knives of European pattern are made, but the outturn is principally in hunting knives and fancy articles. Some cutlery is also manufactured at Jabera, in the Jubbulpore District, but this industry, as indeed all trades in iron or steel, except common blacksmiths' work, is dying out.

(6) SILVER WIRE DRAWING.

This industry is practised at Burhanpur, and is a relic of the times when Burhanpur was the seat of a Mahomedan court. The wire is drawn from bars of silver of uniform size, each of which receives a gilding. The bars are made up and the wire partially drawn out under municipal supervision, and a duty of R1-8-0 is levied on each bar. The process consists in drawing the bar through a series of holes of decreasing size on an iron plate. The industry is understood to be in a flourishing condition, and possesses a considerable reputation, which it will probably retain, so long as native gentlemen adopt their national head-dress, in which silver and gold thread mixed with silk is largely used. But a kind of nondescript smoking cap seems to be now-a-days much in vogue among the educated classes. The industry has been affected by the decline of native courts, and by the opening of the railway, which has destroyed the business of Burhanpur as the depôt for the trade between Malwa and the Deccan.

(7) LAPIDARY'S WORK.

The pebble work of Jubbulpore consists of knife handles, paper knives, paper weights and the like, cut from stones found in the valley of the Narbada and brought principally from the marble rocks. The Deputy Commissioner writes as follows :—

"We have, for example, close to Jubbulpore, any amount of steatite and marble, why should we not in time compete with the soap stone workers of Agra and the marble workers of Jaipore.

(8).—POTTERY.

Baked pottery, for common use, is made in almost every large village. Burhanpur glazed pottery has an ancient reputation. It is an ornamental glazed earthenware of a brown yellow colour, diversified with decorations in light yellow lines. The secret of glazing was, it is said confined to a single family, the survivor of which died without revealing it. The art is, therefore, it is believed, extinct.

(9).—GLASS MANUFACTURE.

Glass bangles and small vessels of rough shape are made at Katangi, in the Jubbulpore District.

(10).—LEATHER MANUFACTURE.

Embroidered leather work is made at Chanda, and is said to be the only industrial relic of the past magnificence of this ancient Gond city.

(11).—COTTON FABRICS.

The manufacture of cotton has long been a speciality in the Central Provinces. Nagpur, Bhandara and Chanda have been the main centres of this industry. The thread was celebrated for its fineness. It is reported that, in the year 1867, a piece of thread was exhibited at a local exhibition of such astonishing fineness that a pound's weight of it would have reached a distance of 117 miles. The greater part of the woven goods consists at present of turbans and dhotis which are distinguished by a border of dark red silk. The industry has, however, greatly declined of late years, owing to English competition and the opening of the Nagpur Cotton mill. The manufacture, however, of coarse cotton cloths worn by the lower classes does not seem to have suffered to the same extent; though much dearer than machine-made fabrics they are preferred on account of their greater strength and durability. In Bastar, the outcaste Mahars weave the narrow coarse cloths used as langutis by the Marias and other wild tribes.

(12).—SILK FABRICS.

Large quantities of tassar silk are produced, chiefly in the districts of Bilaspur, Seoni, Sambalpur, and Chanda. The silk is obtained from a caterpillar called "kosa." Good silk cloth is made in the town of Bilaspur and at Barpaili in the Sambalpur District. The Deputy Commissioner of Bilaspur reports that the industry has fairly developed during the last 15 years, and tassar silk is now exported to other districts and provinces of India. The demand for it is, however, confined mainly to the richer classes. Latterly, a very brisk demand for tassar silk cocoons has sprung up in the Sambalpur District, and the Agents of silk companies and firms in Madras dealing in raw silk visit the district every year, to purchase as many cocoons as they can obtain.

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The result is that the Bhulias and Koshtas, the native silk spinners, who have hitherto been engaged in this industry, complain of a difficulty in obtaining the raw material, and, although the people of that part of the country are exceedingly fond of tassar silk garments, yet it is believed that much less silk is spun now than a few years ago. Prices have, moreover, risen greatly, and are still rising. Cocoons purchased for exportation are unreeled in Madras, and are sent to Lyons in France to be mixed with Japan and China silk in weaving the coarser fabrics. Should this foreign demand continue, and it doubtless will with the advent of the railway in the Sambalpur District, it is not improbable that the native industry will dwindle and perish.

### (13).—Woollen fabrics.

The Deputy Commissioner, Bilaspur, reports that coarse woollen blankets are made in that district. "The poor agriculturist protects himself from cold by wearing blanket sheets which cost R1-4-0 each, the size being 6 × 4 feet.

### (14).—Dyeing and Calico printing.

Printed fabrics in coarse country cloth are manufactured, in large quantities, in the Chanda District. They are chiefly used for druggets, curtains, bed quilts, and articles for female dress. A coloured cotton cloth called luga of a curious design is made at Sambalpur, and is largely used by the women of the district.

### (15).—Embroidered Stuffs.

Burhanpur produces large quantities of embroidery materials, namely, the Kalabattun thread' *i.e.*, gold and silver thread made by twisting the wire into fine silk.

### (16).—Carpets.

Carpets are made in the Jubbulpore School of Industry. The district was once noted for its carpets, but the industry seems to nave declined.

### (17).—Mining and Smelting.

There are iron industries at Tendukhera, Jubbulpore, Sambalpore and Chanda. Good steel is forged at Tendukhera.

### (18).—Basket Work.

Baskets of tolerably good quality are made at Chanda.

### (19).—Manufacture of paper.

Paper is made at Panchamnagar in the Damoh District, but the industry is in a decaying condition. The Deputy Commissioner writes :—

> "I took up the subject of paper-making in 1875, and sent in a long and detailed report to the Local Government, with a view to utilizing the men at Panchamnagar, but the Government were not disposed to assist, and so the matter dropped. The establishment to a mill and utilization of these skilled workmen are quite feasible, if the Government agree to take over the paper."

We do not concur with the Deputy Commissioner. Considering the various skilful processes now employed in manufacturing paper, and the aid rendered to this industry by science and the mechanical arts, it would be hopeless to attempt to resuscitate an industry based on such obsolete methods as those employed at Panchamnagar. The paper is coarse and rough though strong and durable, and could not compete for a moment in price and quality with the article manufactured by modern methods.

5. It will appear from the above sketch, that the few existing industries of these Provinces none of which have ever been of great importance, with the exception perhaps of the cotton and brass manufactures, are decaying, and some have almost ceased to exist. The tastes of their former patrons nave changed, and they are quite unable to struggle successfully with their European competitors who apply scientific principles and utilize the mechanical arts, while they have shown how incapable they are of going a step beyond primitive and obsolete methods. It would under the present state of things be quite futile to attempt to resuscitate or improve any of the existing industries by establishing technical schools in their neighbourhood. Besides, none of them are commercially of such importance as to justify any public expenditure being incurred in providing special technical instruction on their behalf. In these days, however, when wealth and education are making rapid progress, it would be well to provide, for a considerable portion of the better classes of the people, more or what is termed in the Government of India Resolution "preparatory technical instruction" than is at present available, and the best way to do this is, we consider, to establish a Science and Arts College at the Head-quarters of the province. Some progress has been made in leading the way to the establishment of such an institution by the opening of Agricultural and Engineering classes in connection with the Model Farm at Nagpur.

6. It is lamentable to find that, when an artizan, such as a skilled carpenter, is wanted in some districts of this province, he has to be imported from Upper India. Though there are many youths of respectable family who leave our schools every year with a good literary education, some of them with University degrees and who would be glad of some employment, very few, if any of them have any technical knowledge which fits them for any post save that of a clerk. Hence the Nagpur and Bengal Railway Company has, we are credibly informed, been obliged to import from Northern India almost the whole of its workshop establishment, from its Superintendent to the blacksmiths and carpenters. In the Chhattisgarh Division it has been even obliged to import masons to build its bridges. In some districts of this Province there is not, at present, a carpenter

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capable of making an ordinary table. On a recent occasion th. Deputy Commissioner of Betul reported that he found it necessary to send to Jubbulpore for a few 'ables, etc., needed for his office as there was no one who could make them in his district. Everywhere, and among all classes, more technical and less literary instruction is needed. What is specially wanted is some instruction which would fit the youths of the country for taking part in the industrial arts. They should be trained to do the engineering, superintend and conserve the forests, and improve the agriculture of their country, and to take part in the various manufactures that are now springing up and which can, at present, be carried on only by importing an expensive foreign agency. It would be well if the local bodies—the Municipalities and the District Councils—could be induced to establish scholarships in connection with the railway workshops for instruction in carpentry and blacksmith's work. No difficulty would, we apprehend, be experienced in discovering promising youths of the carpenter and blacksmith caste who would gladly attend the Nagpur, Jubbulpore and Saugor workshops, if aided with a scholarship. The teaching of drawing in the High and Middle class schools in the Province which has been recently introduced will also promote the cause of technical instruction. Beyond measures of the kind specified above we do not consider that Government can, at present, do anything suited to the immediate requirements of these Provinces.

7. In this connection, we would mention the steps that have been taken to promote technical education, of a special character, in these Provinces—

(1) the establishment of the Agricultural class at Nagpur,

(2) the opening of the Engineering class at Nagpur.

The Agricultural class has proved a distinct success. It is attended by 20 pupils, who are not only taught the principles of agriculture, but receive practical instruction in the subject in the farm attached to the Government garden. The Engineering class is still in an experimental stage, and it would be premature to pronounce an opinion as to its ultimate success, but, at present, it promises well. Fifteen technical scholarships, of which ten are for natives and five for Europeans and Eurasians, are awarded annually. The studentships are of the value of R8 for natives of India, and R10 for Europeans or Eurasians, and are tenable for two years in a workshop or colliery. Thirteen students are at present under instruction in the Bengal-Nagpur Railway workshop, of whom 5 are Brahmins. The students receive sound instruction in carpentry and blacksmith's work, and are made into thoroughly good mechanics. If any student is found without any aptitude for the work, his services are dispensed with. There is a railway workshop at Jubbulpore, a Colliery at Warora, and a Government workshop at Saugor—all of which might be utilized as training institutions.

## Industrial Classes in the Central Provinces.

| *Persons engaged in art and mechanic productions.* | R | R |
|---|---|---|
| 1. Workers in books | 223 | |
| 2. ,, in musical instruments | 999 | |
| 3. ,, in prints and pictures | 5 | |
| 4. ,, in carving and figures | 8 | |
| 5. ,, in tackle for sports and games | 8 | |
| 6. ,, in designs, medals and dies | 7 | |
| 7. ,, in watches and philosophical instruments | 37 | |
| 8. ,, in arms | 32 | |
| 9. ,, in mechanics and tools | 11,684 | |
| 10. ,, in carriages | 63 | |
| 11. ,, in harness | 495 | |
| 12. ,, in ships | 7 | |
| 13. ,, in houses and buildings | 23,456 | |
| 14. ,, in furniture | 23 | |
| 15. ,, in chemicals | 864 | |
| Total | ... | 37,911 |
| *Persons working and dealing in the textile fabrics and in dress.* | | |
| 1. Workers in wool and worsted | 27,850 | |
| 2. ,, in silk | 5,077 | |
| 3. ,, in cotton and flax | 540,405 | |
| 4. ,, in mixed materials | 2,224 | |
| 5. ,, in dress | 148,462 | |
| 6. ,, in hemp and other fibrous materials | 6,156 | |
| Total | ... | 730,174 |
| *Persons working and dealing in food and drink.* | | |
| 1. Workers in animal food | 56,724 | |
| 2. ,, in vegetable food | 128,656 | |
| 3. ,, in drinks and stimulants | 46,260 | |
| Total | ... | 231,640 |
| *Persons working and dealing in animal substances.* | | |
| 1. Workers in grease, gut, bones, etc. | 13,468 | |
| 2. ,, in skins, feathers, etc. | 8,222 | |
| 3. ,, in hair | 13 | |
| Total | ... | 21,703 |

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| | R | R | |
|---|---|---|---|
| *Persons working and dealing in vegetable substances.* | | | |
| 1. Workers in gum and resin | 49,741 | | |
| 2. " in wood | 43,348 | | |
| 3. " in bark and pith | 53 | | |
| 4. " in bamboo, cane, rush, etc. | 54,604 | | |
| 5. " in paper | 76 | | |
| Total | ... | 147,822 | |
| *Persons working and dealing in minerals.* | | | |
| 1. Miners | 773 | | |
| 2. Workers in stone and clay | 32,830 | | |
| 3. " in earthenware | 49,236 | | |
| 4. " in glass | 7,757 | | |
| 5. " in salt | 12,653 | | |
| 6. " in water | 19,980 | | |
| 7. " in gold, silver and precious stones | 19,010 | | |
| 8. " in copper | 421 | | |
| 9. " in tin and quicksilver | 316 | | |
| 10. " in lead antimony | 6 | | |
| 11. " in brass and other mixed metals | 11,130 | | |
| 12. " in steel and iron | 30,355 | | |
| Total | ... | 184,467 | |
| Grand Total of Industrial classes in the Central Provinces | ... | 1,353,717 | or nearly 12 per cent. of the total population of the Central Provinces. |

# BURMA.

## *No. 14(a).—Letter* re *the Industrial Survey.*

No. 155—25-E., dated the 4th April 1889.

From—C. G. BAYNE, Esq., C.S., Officiating Secretary to the Chief Commissioner, Burma,
To—The Secretary to the Government of India, Home Department.

**No. 14. Burma.**

Extract from letter No. 2446, dated 18th March 1889, from the Educational Syndicate, paragraphs 3 to 6.

Letter No. 154—25-E., dated 4th April 1889, to Commissioners and Deputy Commissioners in Lower Burma.

In reply to your letter No. 143, dated the 21st March 1889, I am to submit a copy of the letters cited in the margin on the subject of an industrial survey in Burma. The Educational Syndicate have confined themselves in their remarks to a statement of the action already taken in Burma to promote technical education. The Chief Commissioner concurs generally in the remarks of the Syndicate. In his opinion, however, it is expedient that an industrial survey should be made in order that Government may have facts to guide it in deciding in what manner and to what extent it shall encourage, by grants-in-aid and in other manners, proficiency in the various industries of the province. The Chief Commissioner has accordingly instructed District Officers to report on the various industries practised in Lower Burma. When their reports have been received and considered, action will be taken to carry out the second part of the orders of the Government of India which has reference to the establishment of a committee on technical education. The best manner of carrying out these orders will probably be to constitute a sub-committee of the Educational Syndicate, whose duty it will be to occupy itself solely with the subject of technical education.

## *No. 14(b).—Extract from a letter from the Educational Syndicate, to the Chief Commissioner, Burma.*

*No. 2446, dated the 18th March 1889, on technical education in Burma.*

* * * * * * * *

3. As regards technical education in this province, standards of examination have been prescribed in land-surveying, agriculture, telegraphy, photography, silversmith's work, sick-nursing and midwifery. The Executive Committee have under preparation draft standards of examination in tin-smith's work, jeweller's work, watch and clock-repairing, printing, book-binding, dress-making, machine construction, steam-mechanism, mechanical drawing, and tobacco manufacture.

The Executive Committee have made arrangements for supplying the Burma Telegraph Department with signallers of a superior class trained in the technical department of the Rangoon College. In that department a drawing class for the training of students as draughtsmen and designers will be opened by an early date.

4. The standard of general education in Burma as compared with India is low. The majority of pupils experience no difficulty in obtaining remunerative employment as clerks as soon as they have passed the middle school examination. The few attempts made at imparting technical instruction in provincial schools have not been successful owing to want of system in instruction and to the difficulty of finding students willing to be trained as practical workmen. The only institutions that have been uniformly successful in technical training have been institutions especially equipped for and devoted to their particular line of work, and not under departmental inspection.

5. This subject will be taken into further consideration by the Executive Committee on the receipt of information as to the practice of the large training workshops and the technical institutes in England, and as to the measures taken there to promote industrial employment. The Executive Committee have reason to believe that holders of their certificates of technical skill will be ensured a preferential claim to employments by heads of departments, merchants, and other professional persons.

6. It has been stated that from want of a scientific and systematic course of instruction in the various arts and industries, the attempts at technical education hitherto made in schools in this province have failed. By the establishment in Rangoon of a central technological institute it might be possible to train thoroughly, with advantage to the State, passed middle school students in industries common to the province and not already taken up by the local technical institutions connected with the Railway, the Survey Department, and the Dufferin Committee.

# *No. 14(c).—Letter* re *technical education to Commissioners and Deputy Commissioners.*

No. 154—25-E., dated the 4th April 1889.

From—C. G. BYANE, Esq., C.S., Officiating Secretary to the Chief Commissioner, Burma,

To—The Commissioners and Deputy Commissioners in Lower Burma.

**No. 14. Burma.**

I am directed to enclose an extract (paragraphs 22 to 25) from Resolution No. 199, dated the 18th June 1888, of the Government of India in the Home Department. In this Resolution the Government of India discusses the question of the development of technical education. This question has of late years received much attention in Burma as in the rest of India, and it is, the Chief Commissioner believes, generally agreed by the persons interested in the advancement of education that the present system is of too exclusively literary a character and that the time is come to make systematic provision for giving instruction in industrial and commercial subjects.

2. In order to further the development of technical education the Government of India has now ordered in the resolution, of which extracts are appended to this letter, that an industrial survey shall be made in the various provinces of India and that a committee of educational experts and professional men shall be formed to advise on subjects of technical education. The second part of the proposal of the Government of India has already been carried out to a certain extent in Burma by the establishment of the Syndicate. The first part of the proposals, which relates to the survey of local industries, has now to be carried out. The Chief Commissioner requests that each Deputy Commissioner in Lower Burma will proceed to make the survey for his own district and report the result of his investigations to the Commissioner of the Division. The report should enumerate the industries which exist in the district, and should give an account of their nature, of the manner in which they are practised, of the appliances used in them, and of any other information regarding them which gives an insight into their character. The report should further supply information as to the extent to which each industry is practised and as to the circumstances of the industry. It should give statistics of the number of persons engaged on the industry and of the average earnings of workmen and masters. Information should also be given as to the demand for labour in each kind of industry, as to the state of each industry, and whether it is flourishing or decaying and as to its position in public estimation as a calling. The Chief Commissioner desires that Deputy Commissioners will collect information on these topics by personal enquiry and through means of their subordinates. In order that the enquiry may be a thorough one, Deputy Commissioners will not be expected to report till six months from the date of these orders. Their reports should be submitted to Commissioners, who are requested to forward them to this office with such remarks as they may see fit to make.

3. Copies of this letter have been sent to Deputy Commissioners direct.

# ASSAM.

## *No. 15. Reply to Government of India* re *Industrial Survey.*

No. 7124, dated the 3rd December 1886.

From—The Secretary to the Chief Commissioner of Assam,

To—The Secretary to the Government of India, Home Department.

I am directed to acknowledge the receipt of your letter No. 7-217, dated the 23rd July last, forwarding a copy of a Memorandum drawn up in the Home Department on the subject of technical education in India, and requesting to know whether the suggestions made therein, so far as they relate to technical education in Assam, meet with the Chief Commissioner's concurrence, and, if so, what steps, having due regard to financial considerations, the Chief Commissioner would propose to take in order to give effect thereto. **No. 15 Assam.**

2. In reply, I am to say that Mr. Ward has read the Memorandum with much interest; but while concurring with most of the suggestions made therein, he considers that it goes far beyond anything which can be accomplished, or which he would be justified in attempting to accomplish in the Province of Assam. I am also to forward, for the consideration of the Government of India, copy of a letter from Mr. C. B. Clarke, Officiating Inspector of Schools of this Province, whom the Chief Commissioner has consulted on the subject, and whose opinion, as coming from an officer of considerable educational experience in Bengal, Mr. Ward thinks is entitled to much weight.

3. Upon the bifurcation plan recommended by the Education Commission and adopted in the Memorandum, Mr. Ward is very diffident in expressing any opinion. This is, however, a question rather for the Calcutta University authorities to decide. If the University accepts it, there is no doubt that the course of education in the schools of this Province will adapt itself to the decision arrived at. There is, however, Mr. Ward thinks, much to be said in favour of Mr. Clarke's view, that what is wanted in this Province is "instead of introducing new subjects and courses, to cut down the present Entrance Examination to its present most practical part." So far, therefore, as this Province is concerned, the Chief Commissioner would gladly see the single course adopted which Mr. Clarke advocates in his 12th paragraph in preference to the bifurcation plan.

4. The following remarks notice in detail the different recommendations made in the Memorandum of the Government of India:—

*Recommendations 1 to 6* do not apply to Assam.

*Recommendation 7.*—The Chief Commissioner is opposed to establishing agricultural and veterinary schools or classes in Assam. Apart from the fact that this Administration has no funds to spare for providing the additional teachers which would be necessary for such schools or special classes, there is no demand in Assam for technical education of this description.

*Recommendation 8.*—Land-surveying is already being taught in all the middle, upper primary and normal schools of this Province; in the lower primary schools (*pathsalas*), the mensuration of simple rectilinear fields is also taught. In our high schools land-surveying is not taught; there are, however, five special survey schools, established primarily for the education of our mauzadars and mandals, but to which outsiders are also admitted. These schools are now under the special supervision of the Director of Agriculture. If outsiders pass the prescribed examinations, they are eligible for the post of mauzadar or mandal. A copy of the rules * relating to these schools is appended. Every inducement is offered to mauzadars and mandals to attend these schools. If they do not attend and pass the prescribed examinations within a given period, they are liable to be dismissed from their posts; if a mandal, whose ordinary pay is Rs. 6 a month, attends and passes what is called the term examination, he is eligible for promotion to Rs. 8; and if he passes the annual examination he is entitled to immediate promotion to Rs. 8, and is eligible for promotion to Rs. 10 a month. These schools are doing good work, and are turning out mandals quite capable of keeping up from year to year the elaborate survey maps prepared by the cadastral survey party now at work in this Province. In the Inspector's Provincial Report on Public Instruction in Assam, Mr. C. B. Clarke wrote of these schools that he had visited three of them, and "considered the results very good, as compared with anything we have ever attained to in surveying in Bengal." One hundred and eleven mandals passed the term examination last year, and 19 the annual examination. Of mauzadars, 40 passed the term examination and 8 the annual examination. The schools were only opened in 1882-83, and the Chief Commissioner thinks these results are, under the circumstances, satisfactory. The Chief Commissioner also understands that not a few of the outsiders who attend these schools, and receive certificates of having passed the prescribed examinations, get employment on gardens and elsewhere, when they do not actually receive Government

* Published at page 479, Compilation of Assam Circle.

15. Assam.

appointments. The cost of these survey schools came last year to Rs. 3,637, which is as much as this Administration can afford to contribute at present to this particular branch of education. It is, the Chief Commissioner thinks, scarcely necessary to require civil courts and official bodies to employ certificated and passed pupils of these schools. It is quite certain that no uncertificated *amin* of the ordinary class employed in the courts or offices of Assam could compete for employment against a certificated passed student of the survey schools.

*Recommendations 9 and 10.*—Our teachers are quite incompetent to teach drawing, and it will be many years before we can insist upon teachers in our high and middle schools being competent in this respect. Higher qualifications can only be secured by higher pay, which the Province cannot now afford to give. As suggested by Mr. Clarke, Assam can well wait to see what Bengal does in this direction, and when competent teachers are forthcoming there, they can be procured from that Province for employment in the schools of Assam.

*Recommendation 11.*—Mr. Clarke strongly objects to the teaching of elementary science in our schools, and Mr. Ward is inclined to agree with him. In a backward Province like Assam it is desirable to make education as simple and practical as possible; but if elementary science is made, what it is not now, a compulsory subject of the Entrance Examination, it must, of course, be taught in our schools. At present in our high schools the only elementary science taught is contained in Cuningham's Sanitary Primer, the reading of which is optional. Portions of this primer are compulsory in our primary schools, upper and lower. In our middle schools the primer is compulsory, while one of the three following subjects is optional:—Botany, Elements of Natural Philosophy, and Physical Science.

This is all the elementary science now taught in our schools.

*Recommendation 12* is, for the reasons above stated, not applicable to Assam; we do, however, examine in elementary science. The results hitherto arrived at do not encourage us to continue such examinations or instruction.

*Recommendation 13.*—Mr. Clarke, it will be observed, is altogether against this recommendation; but, as already stated, if the University decides to have an alternative Entrance course, the Chief Commissioner is quite prepared, if the funds at his disposal enable him to do so, to carry out this recommendation in one or two of the more advanced high schools of this Province.

*Recommendations 14 and 15.*—Here, again, the funds at the disposal of this administration render it quite impossible for the Chief Commissioner to carry out this proposal. There is, moreover, next to no demand for any technical training in Assam. Such demand as there is can be fully satisfied by creating scholarships to be held by boys from Assam, who will attend any schools or college in Bengal where a technical training is given.

This is already being done in connection with the Williamson Artisan School at Jorhat, a description of which will be found at page 72 of the Provincial Report on Public Instruction in Assam for the year 1881-82. Since that year this school has been placed under the superintendence of the Manager of the Jorhat State Railway, and amalgamated with the Railway workshops. I am to append copy of an extract from the orders issued* by the Chief Commissioner in January 1885 referring to this school. In his last annual report, Mr. Clarke states that the school is making progress, the attendance having averaged 18, and that two boys were sent down last year to Sibpur with scholarships of Rs. 15 a month each. Prior to the issue of the orders of Janaury last our attempts to induce pupils to attend the Williamson School were unsuccessful, owing to there being no demand for such education as it afforded. Under the circumstances, the Chief Commissioner does not think he is justified in spending from provincial revenues money which he can spend far better in providing for other more urgent educational needs of the Province. The cost of the scholarships given to the students of the Williamson Artisan School is met from the Williamson Endowment Fund.

*From the Secretary to the Chief Commissioner of Assam, Public Works Department, to Manager, Jorhat State Railway, No 276, dated 20th January 1885.

*Recommendation 16* does not apply to Assam.

*Recommendation 17.* —See remark above on Recommendation 13.

*Recommendation 18.* —It is quite beyond the power of this administration at present to allot any money specially in support of technical education, nor can it afford to enter upon the experiment of trying to force a demand which does not exist. If a demand for technical education is to be created in Assam, that can, the Chief Commissioner thinks, only be done by the Calcutta University insisting upon such education being made part of the Entrance course. There are more pressing educational needs of this Province which the Chief Commissioner is required first to satisfy before he can give any substantial support to technical education, and he thinks that this Province, in its present backward condition, may well wait another quarter of a century before it enters on any experiments in the direction indicated by the Memorandum of the Government of India. The same remark applies to the Boards and the Municipalities of this Province. Our Boards have no funds of their own to spare; they depend largely for their resources on provincial grants, and, if pressure is put upon them to support technical schools, the annual provincial grants must be increased to enable them to comply with the wishes of Government. At present all the energies and resources of our Boards are, and must for some time to come be, devoted to the extension of primary education; they have little to say to secondary education, which, with the exception of a few aided schools, is entirely in the hands of Government. The Municipalities of this province can also barely meet from their income their necessary annual expenditure; they have recently been relieved of police charges, on the understanding that the funds thus set free will be devoted to medical and educational purposes. This condition is being fairly complied with, and the Chief Commissioner does not think he can ask any Municipality to do more than it is now doing in the cause of education.

# No. 15(a).—Note by Mr. Clarke on Technical Education.

No. 2110, dated the 26th August 1886.

From—C. B. CLARKE, Esq., M.A., Inspector of Schools, Assam,

To—The Secretary to the Chief Commissioner of Assam.

**No. 15 (a). Technical education in Assam, 188**

It is with much reluctance that I reply to your memorandum No. 4572 of 12th August 1886, requesting me to report "on the subject," nominally technical education, but expanded so as to include many disputed points in education policy. On these I have written much in the course of the last 20 years, and I do not hope to persuade anybody to my way of thinking.

2. I feel, nevertheless, bound to go over shortly most of the ground in reply to your request for a report on the subject. I have nothing new to say, but I am not able (nor would it be any use) to refer the Government of Assam to the various papers I have already written on this question.

3. It simplifies the subject a good deal in Assam that it is not necessary to say anything about "*Collegiate*" or upper technical education. The "Note on Technical Education" under report is really mainly directed to the high schools.

4. The former idea of the Government of India was that the number of students trained as clerks was in excess of the Government requirements, and that it would be well to train a certain number of the writer castes as carpenters, smiths, etc. There are traces of this view still in the present "Note on Technical Education." All such efforts have utterly failed. I suppose out of all our carpentry classes, etc., in Bengal there is now no high caste man working as a carpenter. I doubt whether, if carpentry classes were opened at Rugby or Winchester, any of the boys would ever work as carpenters. Carpentry classes could be formed in the English large schools educating for the Universities, and many of the boys gladly learn some carpentry, and manual skill in carpentry would remain to them as a gentleman-like accomplishment in afterlife. The high caste Bengali boys are not disinclined to learn carpentry on this wise: there is a carpentry class of this kind at the Calcutta City College (which Mr. Ananda Mohan Basu, M.A., tells me is successful *in this way*). The boys at Gauhati high school have lately asked for such a class: it is merely a question of expense, and whether the Government or the boys themselves shall pay for it. The boys at Gauhati do not pretend that any of them intend to turn *mistris*.

5. The Local Governments, Bengal especially, have also tried schools, technical within the meaning of the note under report, which were designed to give boys a more "practical" education than the present high schools, which teach the University Entrance Examination course and nothing else. There have been efforts also both by the Bengal and the Assam Governments to make the high schools themselves teach something in addition to the Entrance course: as practical surveying. All such efforts have failed. The boys want to pass the Entrance Examination, to do which requires their utmost exertions, and they judiciously decline to carry any extra weight.

6. Mr. Tawney now comes forward with a plan, which forms the backbone of the note on technicial education, *viz.*, that the University shall carry their bifurcation of studies system whole step lower, *i.e.*, to include the first and second (perhaps also the third) classes at the high schools: that there shall be two Entrance Examinations, A and B, whereof A shall be as at present: B shall be as at present, the literary English and the second language being omitted, Elementary Chemistry and Drawing added and Mensuration perhaps given greater weight.

7. In this scheme there is nothing for the Government of Assam at present to do. Mr. Tawney proposes that the University should set up this Technical or B course for the Entrance Examination, and it will be for the Government of Assam then to teach either the A course in all Government high schools or the B course in all the Government high schools, or the A in some, the B in others, the A and B in others.

8. I am against the whole bifurcation plan. The University has had a bifurcation plan for the B. A. for some years, and Mr. Tawney has had the working under it for some years; and I should think he can only have recommended an A and B Entrance Examination, because he knows he cannot get what I have recommended, *viz.*, to have but one Entrance Examination, and that pretty much his B plan. I recommended this about a year ago in a letter to the University Registrar, and I am told (privately) that one or two unpopular gentlemen are pushing it now. I do not think it could be carried, unless the University should be largely reconstituted. The native members of the Senate very generally support the more ambitious project, whatever the plan under discussion may be. They wish to imitate all the complication and variety of European system; and they invariably argue, "how desirable that our young men should know Sanskrit, how desirable that they should know Science: can our education be considered worthy of a great and national University if we narrow down our curriculum?" Have I not heard this in a dozen different shapes in the Senate House in College Square, Calcutta?

9. I agree with Mr. Tawney that the main reform wanted in the Entrance course is to do away with the second language (I urged this in my last year's Education Report). I also agree with him that the "literary" English may be abandoned, and that it is sufficient to make the boys answer all the questions in the Entrance Examination in English. I do not agree altogether with Mr. Tawney about the History and Geography, or perhaps he agrees really with me, but thinks it best not to say all his mind. I should like to reduce the History (for Entrance) to the History of England from the invasion of Cæsar to the death of Richard III and the Geography to some two-anna primer. If more History is wanted, I would, as Babu Bhudev Mukharje, C.I.E., long ago suggested, add a very short History of Greece. I would have no Elementary Physics and no Elementary Chemistry.

10. Without going into all the reasons for the details of this "B" or technical course for the Entrance Examination, I would urge on the Government of Assam that the vital question for this Province is whether there is to be an amended Entrance course or whether there are to be two

No. 15 (a). Technical education in ASSAM, 1886.

alternative courses. In this Note it is argued that to teach the alternative courses in the high schools would not cost Government much, because it would only require *two* additional teachers in school where there are already eight teachers (often twelve). This is illusory: the two additional teachers we should want in each high school would be for the two (B) first classes, and these additional two would have to be specially qualified in Elementary Chemistry and Mechanical Drawing. I estimate that the providing two such teachers (who would have also as English teachers to hold their own against the present head and second masters on the A side) would increase the net cost of every high school in Assam to Government to the extent of 50 to 100 per cent., and I fancy that for some years it would be very difficult even at such a cost to get the required teachers on the B side. I fancy the boys would nearly all read on the A side.

11. As I have said above, it might be possible, as in the Bengal colleges, to take the A side only in some high schools. Thus, we might have both A and B sides at Sylhet and Gauhati: we might have the B side only at Dibrugarh and Jorhat, the A side only at Sibsagar and Nowgong: and so on. As I have said above, this sort of thing has been tried in the Bengal colleges: the Assam Government will see, without my going into detail, how unsatisfactory such a system is for the Administration, and how still more unsatisfactory it would be for the boys.

12. If the funds at the disposal of Government for education were unlimited, I would not so strongly counsel the Government of Assam against double alternative system. To make the most of our money and our teaching staff, I want, instead of introducing new subjects, and courses, to cut down the present Entrance Examination to its present most "practical" part. I am quite willing to extend the mensuration, and to introduce mechanical drawing. The alternative plan supported in the Government of India note would possibly induce 25 per cent. of the high school boys to select the B or technical course; whereas my plan would cause all the boys to go through the same technical course, without any of the expense or trouble of the alternative courses.

13. In Europe the art of our popular lecturer on science is to delude the audience into thinking they understand something they do not, and which few of them will ever live to grasp; the art of the popular shilling manual is to pretend to have proved propositions by a mixture of assumption and dialectics. By these methods there has been spread a kind of interest possibly; but I do not value the educational result, in teaching people how to think out things for themselves, as of much value. I am disposed in Europe to confine education to what can be taught thoroughly. And much more so in Bengal. As to employing high paid Bengali M. A's to exhibit Geisseler's tubes to boys who have no conception of any mechanical theory of electricity, it would be cheaper, and probably more instructive (Mr. Brennand used to say), to let off small squibs or rockets to illustrate unstable chemical equilibrium.

14. To apply this concretely to the Entrance Examination. This examination requires "explanation of the tides." I have asked Entrance boys in Assam—"The attraction of the sun on the earth is greater than that of the moon, for the earth goes nearly in a circle round the sun and pays comparatively small regard to the moon, nevertheless the tide raised by the moon is much greater than that raised by the sun. How is this?" I have asked this question, not expecting any boy to answer. But if a boy cannot answer it, what can be the educational value to him of learning the "explanation of the tides." One of the most experienced head-masters in Assam said to me—"Why do you ask such questions, Sir? you know that no teacher in Assam can answer such: all we can do is to make the boys write out accurately the explanation of the tides in Blanford." Exactly so, but then, why does the University require explanation of the tides of the boys? The explanation in Blanford contains implicitly the answer to my question. I do not believe that anybody can understand usefully any explanation of the tides, unless he has learnt a good deal of mathematics first.

15. Or, to take an example from the History required of boys at the Entrance Examination: there are questions about the Bill of Rights, the Independents and Presbyterians, the exile of Shaftesbury, and the rise to power of Walpole. I have seen marvellous answers to such questions from Bengali boys: answers highly creditable to the skill and patience of their teachers; but I value such answers myself not a whit higher than their explanations of the tides.

16. To sum up the question of introducing technical education (*i.e.*, a B alternative course) in the high schools. This is, under the present constitution of the University, a matter entirely in the hands of the University. The Government of Assam need only say this suggestion for technical education (the only one in the note that much affects Assam) does not meet with its concurrence; but that, if the University should introduce such an alternative Entrance Examination, the Government of Assam would probably add a B side to the schools at Sylhet and Gauhati, leaving the other high schools as at present, *i.e.*, with an A side only.

17. Coming down to middle primary schools, I would make the same suggestion I have made with regard to the high schools, *viz.*, that, instead of attempting a double set of schools, or an extra Government centralised system of technical schools (as recommended in the note under report), we should go as far as we can in simplifying the course in our middle and primary schools, and should push in them, as much as possible, surveying and mechanical drawing.

18. The Government of Assam must recollect, in dealing with this question, that our teachers in the primary schools of the Brahmaputra Valley cannot be depended upon to work the first four rules, simple and compound of arithmetic. I need only refer, in proof of this, to the Normal School Examination, and to the Teachership Examination results in this year's Report on Education. The more closely we confine the primary course for the present to writing and arithmetic, including in the latter country arithmetic, simple mental arithmetic, and the very elements of mensuration, the more real progress we shall make.

19. As regards surveying, I have been taking every step I can to push surveying ever since I came into the Province of Assam: but very little can be done until we by degrees get better teachers. The syllabus I have lately put out for the middle and primary schools in surveying is most meagre; but I was afraid to attempt more than the masters can teach. I have found, in the best schools, the boys so badly instructed as to the difference between a linear and a square foot, that they brought out the most ridiculous results in their areas. We have to begin from the very beginning.

20. Further, surveying is tedious work : to attain any certainty of result, much practice *in the field* is essential. For plotting and mapping solid tables, good paper, certain instruments are essential (I have given or promised a solid table to all Government schools), chains, tapes, cross staves or reflecting squares, boxes of instruments, contingent allowances for paper, Indian ink, etc., have all to be supplied. The Government schools in Assam being only 26 in all, it would not be difficult for Government to furnish all these schools liberally with survey material : all other schools would be compelled by competition to supply themselves (as near as they would afford) like the Government schools.

21. I assume that for this lower grade of surveying, the old chain-and-staff method, finding all areas by half product of base and perpendicular, is the only one worth teaching. The plane table is only useful for special work, and the chain and needle as near as may be useless. The next superior grade of surveying (to be reached gradually by our normal schools, possibly by the high school if we can get rid of the second language) would be by chain and theodolite, closely followed by trigonometrical surveying. (If Government was to have a very simple type of theodolite, reading, say, to 10", correctly designed, and to have 10,000 or 20,000 of these made by machinery like Waltham watches I believe such might be supplied by contract very cheap : and replacing the needles by these, a real advance in Indian agricultural and village surveys might be effected).

22. As to the teaching of mechanical drawing, I think in this Assam must follow Bengal. As soon as they have got the thing fairly at work in Bengal and a supply of competent teachers at a moderate salary, then it will be soon enough for Assam to begin by importing a few of these teachers.

* * * * * *

24. In conclusion, I would repudiate any idea that I am opposed to technical education, particularly to the two features that the note now pushes, *viz.*, surveying and drawing. Surveying has always been a pet subject with me, and I sat on a committee for the University 12 or 15 years ago (the other members Dr. Ewart, Mr. Woodrow, Mr. H. F. Blanford), who, after consulting Mr. H. H. Locke, unanimously agreed to advise the University to take up drawing in the high schools, when our advice was not accepted.

What I want to do is, with Mr. Tawney, to get rid of the second language, and literary English in the high schools, and further, to get rid of constitutional English History and Science made easy In the primary schools, at least in Assam, we have enough to do for some years hence to teach the three R's ; we may direct our arithmetic mainly towards mensuration and surveying. In a word, I want not to attempt to run before we can walk.

25. I have omitted all reference to the plan now started in Madras, the Government should (not teach, but) examine in watchmaking, shoemaking, etc., taking a small fee from each candidate and giving a certificate of merit and prize to every candidate who passed. The note on technical education decides that such a London University system would be best let alone by Government and carried out by the University. So far as Assam is concerned, as soon as the University of Calcutta has got such a system at work in Bengal, it will extend itself (like other parts of the Calcutta University system at present) to Assam, without any action on the part of the Assam Government.

26. This scheme, however, would in no way interfere with our present schools or divert fund from them. It might be attempted by the Assam Government so cheaply that, though I am not very sanguine about the experiment, I would certainly not oppose its being tried. The experiment might be tried with two or three only of the commonest trades, and extended to other trades, if successful. Carpenters and smiths might be given certificates at Jorhat, Dhubri, or Dibrugarh. But any such plan would have to be carried out, not by the Education Department, but by the Public Works.

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## *No. 15 (b).—Management of the Jorhat Artizan's School.*

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No. 276—282, dated the 8th January 1885.

From—The Secretary to the Chief Commissioner of Assam, Public Works Department,

To—The Manager, Jorhat State Railway.

I am directed by the Chief Commissioner to communicate the following orders regarding the future management of the Jorhat Artizan's School, which I am to request you will give effect to with the least possible delay.

2. Instead of its being a separate institution, as before, and worked under the orders of the Inspector of Schools, it will be amalgamated with the railway workshops and placed directly under your orders.

3. The selection of the students will rest with yourself, aided, if necessary, by the Assistant Commissioner of Jorhat, and the total number for the present should be limited to 30, who, in addition to receiving a mechanical training, must attend a class daily to receive instruction in reading, writing, and arithmetic in Assamese, which will be imparted to them by a pundit on a salary of Rs. 10 per mensem, who will be placed at your disposal by the Inspector of Schools, and to whom you should issue orders as to the most suitable hour he is to attend the school. It will, perhaps, be advisable to limit the interval of the theoretical training to, say, two hours per day ; but the extent of this interval will be left entirely to you.

4. During the remaining interval of your working day, the students should attend regularly at the workshop to receive instruction in carpentry and iron-work, which should be imparted to them by the overseer in charge under your orders. It will be a part of his duty to enforce regularity of attendance and to closely supervise the work of the students.

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5. As a rule, the students will, in the first instance, watch and afterwards take part in, the general work at the shops. When they are employed separately from your workshop establishment, the necessary raw material must be supplied to them by the shops. It is important that a proper amount of work should be exacted from them daily, in order that they should get into thorough workmanlike habits, and learn to be useful artizans. It will not be necessary to keep separate accounts for the work turned out by the students. One set of accounts will be ample, in which all your workshop transactions will be shown.

6. As a kind of inducement to the students to take an interest in their work, eighteen scholarships as follows, tenable for one year, will be awarded to those whom you may consider to be most deserving, *viz.*,—

| | |
|---|---|
| Six scholarships | @ Rs. 4 each. |
| " " | @ " 5 " |
| " " | @ " 6 " |

As a further inducement, scholarships of Rs. 15 per mensem, tenable for three years at Sibpur, Howrah, will be awarded to the two best students.

7. Other students, when they are considered qualified, will receive certificates of fitness to go out as carpenters and blacksmiths.

8. All the raw material which the school has recently received from Mr. Rolfe should be taken over by you and paid for according to the valuation at which he has supplied it to the school, and the sum thus realised should be credited to the "Williamson Educational Fund."

9. The tools and plant, which at present belong to the institution, will be made over to you free of cost by the Assistant-Commissioner of Jorhát, according to a list which he will hand over to you. They should be carefully examined, and only such as are serviceable are to be brought on to your books, all others being disposed of by auction, or in such manner as you may consider desirable.

10. In return for the services rendered by the railway, the Williamson Fund will pay to you monthly a contribution of Rs. 100, which you are to credit as workshop receipts.

11. On the basis set forth above, the annual expenditure on account of the students may be roughly computed as follows:—

| | Rs. |
|---|---|
| Contribution to the railway | 1,200 |
| Eighteen scholarships at Jorhát | 1,080 |
| Two " at Sibpur | 1,080 |
| Pandit's pay | 120 |
| Total | 3,480 |

To this should be added a sum of Rs. 600, which the Artizan's school has to pay for repair to the Golaghat and Jorhát school buildings, which will increase the annual outlay to Rs. 4,080 and which exceeds the yearly interest of the Williamson Fund by Rs. 68; but this is sure to be saved by short drawings under the head "Scholarships." The workshop at Jorhat will also require repairs from time to time, which can be met from savings under the head "Scholarships at Sibpur" during the first two years, for in the first year the two scholarships will only amount to Rs. 360, and in the second year to Rs. 720, instead of Rs. 1,080 for each of these years, which the estimate provides for.

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## REVENUE DEPARTMENT.

The following rules for Survey schools are prescribed in supersession of those published on the 15th February 1883:—

### PART I.—MANAGEMENT OF SURVEY SCHOOLS.

1. Survey schools will be maintained for the present by Government as follows:—

| | |
|---|---|
| In Kámrúp | 2 schools. |
| " Darrang | 1 school. |
| " Nowgong | 1 " |
| " Sibságar | 1 " |

2. The schools will be under the direct charge of the Deputy Inspector of Schools in each district, in subordination to the Director of Agriculture, and all expenses connected with them will be defrayed, after 1st April 1885, out of the Agricultural budget.

3. The following scale of expenditure is sanctioned:—

| | | | Rs. |
|---|---|---|---|
| Kamrup | Each school | One master on | 50 a month. |
| | | " " " | 40 " |
| | | " peon " | 7 " |
| | | Contingencies | 36 a year. |
| Darrang, Nowgong, Sibságár | " " | One master on | 40 a month. |
| | | " peon " | 7 " |
| | | Contingencies | 36 a year. |

The present schools at Jorhat and Mangaldai may also be continued on a similar scale of expenditure to that in Sibsagar and Tezpur, provided the mandals of those sub-divisions agree to bear the whole cost. Provided also that if these schools prove inefficient, the Director of Agriculture shall be at liberty to abolish them.

4. The maximum number of pupils at the schools with two masters shall be 48 and at schools with one master 30.

5. Ordinarily, the maximum proportion of candidates to mandals shall not exceed 1 to 5, and in no case shall candidates be admitted if by so doing any mandals are excluded.

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6. Admissions to the Survey schools shall be made only at the beginning of each term. There shall be four terms during the year :—

| | |
|---|---|
| First term | 1st January to 31st March. |
| Second term | 1st April to 30th June. |
| Third term | 1st July to 30th September. |
| Fourth term | 1st October to 31st December. |

There shall be no holidays or vacations, except those gazetted as public holidays for the district.

7. At the end of each term an examination, called the term examination, shall be held by two officers, one of whom shall be the Deputy Inspector of Schools and the other one of the following, at the option of the Deputy Commissioner :—

(1) Extra Assistant Commissioner.

(2) Sub-Deputy Collector.

(3) Subordinate Executive Officer of the Public Works Department.

8. The course of instruction and the standard of examination for the term examinations are as follows :—

*Course of Instruction for Term Examination.*

(1) *Arithmetic*, including (a) the first four simple rules, (b) the four compound rules, (c) reduction so far as it applies to Indian money and to Assamese land measurement, *i.e.*, the reduction of square feet to *bighas, kathas, lesas*, and *vice versâ*.

(2) *Mensuration*, including (a) the use and construction of scales, (b) the use of compasses for plotting, (c) finding the area of a triangle, given its base and vertical height.

(3) *Surveying*, including (a) surveying with the 30-foot chain and cross staff, by the system of chain triangulation with offsets to bends, (b) recording the results in a field-book and plotting them out on a scale of 16″ to the mile, and calculating the area in *bighas, kathas*, and *lesas*.

*Subjects of Term Examination.*

(1) One paper in arithmetic and mensuration (equal number of questions in each subject)—100 marks.

(2) The actual measurement with the 30-foot chain of a plot of ground not less than 10 *bighas* in area, making a map of the same on the scale of 16″ to the mile, and calculating the area in *bighas, kathas, lesas*—100 marks.

9. The results of the Term Examinations will be reported jointly by the Examiners through the Deputy Commissioner to the Director of Agriculture, to whom the papers of those who obtain marks exceeding 50 per cent., together with a correct map of the ground surveyed by them, shall be sent. On receipt of the names of the successful examinees from the Director of Agriculture, the Deputy Commissioner will issue second-class certificates, and will make the necessary entries in the registers of mandals and mauzadars.

10. Examinees who obtain less than 50 marks in either the paper or the practical survey shall be considered to have failed.

11. The course of instruction and the standard of examination for the annual examination are as follows :—

*Course of Instruction for the Annual Examination.*

The course for the second grade, and in addition the following subjects :—

1.—*Arithmetic*, including—

(a) Rule of three.

(b) Greatest Common Measure.

(c) Least Common Multiple.

(d) Vulgar fractions, so far as is necessary as a preparation for decimals.

(e) Decimals (omitting repeating decimals).

(f) Tables of English land measurement.

(g) Reduction from *bighas, kathas*, and *lesas* to acres and decimals, and *vice versâ*.

2.—*Mensuration*, including—

(a) Use of the talc square and area comb.

3.—*Surveying*, including—

(a) Use of the optical square.

(b) Surveying with the Gunter's chain.

(c) Recording the results in a field-book and plotting on any given scale and calculating area in acres and decimals of an acre.

*Subjects of Annual Examination.*

(1) One paper in arithmetic and mensuration—100 marks.

(2) The actual measurement with a Gunter's chain of a plot of ground not less than five acres in extent, making a map of the same on the scale of 16″ to the mile, and calculating the area in acres and decimals of an acre, and also in *bighas, kathas*, and *lesas*—100 marks.

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12. The annual examination will be held on the 1st February of each year at the head-quarters of each district by the Deputy Inspector and an Extra Assistant Commissioner deputed by the Deputy Commissioner for the purpose. The papers will be set by the Director of Agriculture assisted by the Deputy Superintendent of the Cadastral Survey, and the answers will be sent in to the former by the Deputy Commissioner. The field-book and map made by each mandal, together with a correct map of the ground surveyed, will also be sent to him, with a certificate from the Deputy Inspector and the Extra Assistant Commissioner that the land was measured and plotted in their presence, that so many hours were occupied in the work, and that the mandal received no help in it. The Director of Agriculture will report the result of the examination to the Commissioner of the Assam Valley Dstricts, who will issue first-class certificates to those who have passed.

13. Examinees who obtain less than 50 marks in either the paper or the practical survey shall be considered to have failed.

14. Ordinarily, the school hours will be from 7 to 10 A.M. and from 1 to 5 P.M., but the Deputy Inspector of Schools may fix other hours, with the sanction of the Deputy Commissioner, provided the total be not reduced.

15. The following registers will be kept up:—

(1) Detailed register of daily attendance.

(2) Abstract register of daily attendance.

(3) Admission register, giving details as to parentage and residence, etc., of all mandals and candidates admitted.

(4) Expenditure register showing monthly cost of survey school.

(5) Receipt register, showing all sums realized, such as fees from candidates, etc.

16. The following instruments will be kept for the use of the pupils:—

At each school in Kamrup—

| | |
|---|---|
| Optical squares | 5 |
| Gunter's chains | 2 |
| Area combs | 10 |
| Talc squares | 10 |
| Thirty-foot chains | 6 |
| Mathematical instruments in boxes | 3 |
| Drawing compasses | 20 |
| Parallel rulers | 10 |
| Brass or electrum plotting scales | 10 |
| Cross staves | 8 |

At each of the remaining schools—

| | |
|---|---|
| Optical squares | 3 |
| Gunter's chain | 1 |
| Area combs | 5 |
| Talc squares | 5 |
| Thirty-foot chains | 6 |
| Mathematical instruments in boxes | 2 |
| Drawing compasses | 15 |
| Parallel-rulers | 5 |
| Brass or electrum scales | 5 |
| Cross staves | 6 |

The teachers will be held responsible that these instruments are kept clean and in good order.

17. Every teacher or set of teachers at a survey school ought to pass one-fourth of the total number of mandals attending his school through the term examination at the end of every quarter.

Fractions less than one-half to be omitted; thus if there are 17 or 18 mandals, the teacher should pass 4. If there are 19, he should pass 5.

18. For every mandal passed in excess of this minimum, a reward of Rs. 10 will be given to the teacher, and for every mandal below this minimum who fails to pass, a fine of Rs. 5 will be inflicted.

19. Mandals who fail to attend regularly after their names have been entered on the list, shall lose their pay for each day of absence, except in case of sickness supported by medical certificate, and accepted by the Deputy Inspector.

20. Rules 18 and 19 *mutatis mutandis* will apply to candidates, except that the rewards and fines will be only Rs. 4 and Rs. 2 per candidate.

21. If a fine is inflicted owing to failure of the requisite percentage of mandals to pass, no reward can be given, no matter how many candidates are passed, but fine on account of failure of candidates will be no bar to reward for the passing of mandals.

22. On receipt of instructions from the Director of Agriculture showing what rewards or fines are to be inflicted, the Deputy Commissioner will incorporate them in the next pay-bills of the teachers.

PART II.—LIABILITY OF MANDALS AND MAUZADARS TO PASS THE SURVEY EXAMINATIONS.

23. In the four districts in which survey schools are provided all persons now holding the office of mandal shall be required by the Deputy Commissioner to attend the school and to pass the examination prescribed in Rule 7.

The Deputy Commissioner may, however, exempt any mandal from attendance and examination on the ground that his service has hitherto been approved, and that he is too old to profit by instruction.

24. Only one mandal at a time shall ordinarily be sent from any one mauza to the survey school, and during his absence his work shall be distributed by the mauzadar amongst the remaining mandals of the mauza. Provided that if the mauzadar, in the opinion of the Deputy Commissioner, needs a substitute, one may be appointed on Rs. 3 a month and maintained at Government expense during such period, not exceeding two terms, as the mandal he is acting for may require to enable him to pass the term examination.

25. A mandal who fails to pass the examination at the close of his second term of study will be liable to summary dismissal. Provided that the Deputy Commissioner may, under special circumstances, permit the mandal to remain at the school for a third term, or may exempt him from passing the examination.

26. A mandal who has obtained a second-class certificate will be allowed to study for the first class during two terms under the conditions noted in Rule 25. If he passes the annual examination, he will receive a first-class certificate.

27. A mandal who passes the term examination and obtains a second-class certificate will be eligible for promotion to the Rs. 8 grade, provided the Deputy Commissioner on general grounds thinks him suitable for such a grade. A mandal who passes the annual examination and obtains a first class certificate will at once be promoted to Rs. 8, if not already in that grade, and will be capable of promotion to Rs. 10 a month.

28. The Deputy Commissioner shall keep a register of all the mandals in his district in the appended form. Column 6*a* or 6*b* will be filled up from the Examiner's report. When a mandal fails to pass, and is dismissed under Rule 26, the fact will be noted in column 7. All orders of dismissal of mandals under Rule 26 shall be made by the Deputy Commissioner, and shall be final.

29. All persons now holding the office of mauzadar in the four districts in which survey schools are established, will be required to pass the term examination within one year from 1st April 1885; and failing this, they will be liable to dismissal. Provided that the Commissioner may exempt any mauzadar, on cause shown to his satisfaction, from the operation of this rule. All orders of dismissal of mauzadars under this rule shall be made by the Deputy Commissioner, subject to confirmation by the Commissioner.

30. A mauzadar may present himself at any term examination, or at the annual examination, without having attended the survey school, on condition merely of giving the Examiners one week's notice. Any mauzadar who desires to attend the survey school may do so, the number of mandals, or candidates being reduced in order to admit him, but he shall not ordinarily be allowed to attend more than two terms without passing.

31. No mandal or mauzadar can appear at the annual examination until he has obtained a second-class certificate.

32. The Deputy Commissioner may make whatever arrangement he considers best for carrying on the work of a mauzadar studying at the survey school.

33. After the 1st April 1886, no person shall be appointed to the office of mauzadar who has not obtained a first-class certificate under these rules. Provided that the Deputy Commissioner may nominate a second-class certificated or unpassed candidate for approval by the Commissioners if no other suitable person is available.

## Part III.—Admission to the Survey Schools of Candidates for the Post of Mandal.

34. After the 1st April 1885, no person shall be appointed to the office of mandal who has not obtained a second-class certificate under these rules. Provided that the Deputy Commissioner may appoint an uncertificated candidate if no other suitable person is available. But a special report must be made explaining the circumstances, and the Commissioner's sanction must be obtained to such an appointment.

35. Candidates wishing to attend the survey school shall apply for permission to the Deputy Commissioner, who will regulate the number to be admitted according to the vacancies in the school. No candidate should be admitted who is not already well acquainted with the first four rules of arithmetic and cannot pass an examination in them.

36. If a candidate fails to obtain a second-class certificate at the end of his second term, he must be removed, unless the Deputy Commissioner, for special reasons, permits him to remain.

37. A candidate may present himself at the term or at the annual examination without attending the survey school; but, if so, a fee of Rs. 2 for the term examination and of Rs. 4 for the annual examination will be levied.

38. A candidate who has obtained a second-class certificate may continue his studies in the higher grade for two terms, but not longer, unless he obtains the special permission of the Deputy Commissioner to remain during a third term.

39. Candidates shall pay a fee of Rs. 2 for every month or part of a month of their attendance in the survey school. This fee must always be paid in advance.

40. Candidates not attending the school who wish to present themselves at the annual examination must give one month's previous notice to the Deputy Inspector.

41. A candidate shall not be less than 18 or more than 30 years of age when he presents himself for examination.

No. 15 (*b*).
Technical
education in
ASSAM, 1886.

42. Candidates attending the school shall be charged no fee for the annual or term examinations.

43. The Deputy Commissioner shall keep a register of certificated candidates in the form appended to these rules.

The name of any candidate who shall not have received an appointment within three years from the date of his obtaining a certificate, shall be struck out of the register unless the Deputy Commissioner decides for special reasons to retain it.

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## FORMS.

*Form of Second-class Certificate given at the Term Examination.*

CERTIFIED that son of resident in village mauza district obtained the marks noted below at the term examination of the Survey School, held on the day of 188 , *viz.*, *Arithmetic and Mensuration* *marks, and Surveying* *marks*, and has been awarded a second-class certificate.

*Dated the* (Sd.)

*day of* *188* . *Deputy Commissioner.*

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*Form of First-class Certificate.*

CERTIFIED that son of resident in village mauza district obtained the marks noted below at the annual examination under the Survey School Rules held at on the day of 188 , *viz.*, *Arithmetic and Mensuration* *marks, and Surveying* *marks*, and has been awarded a first-class certificate.

*Dated the* (Sd.)

*day of* *188* . *Commissioner.*

*Register of Certificated Candidates.*

| 1 | 2 | 3 | 4 | | | 5 | | | 6 | 7 | 8 | 9 | | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name of candidate. | Father's name. | Age when he passed the examination. | Birth place. | | | Residence. | | | Date of passing the examination. | Place of passing. | Class of certificate obtained. | Marks obtained in | | Deputy Commissioner's initials and remarks (enter here particulars of appointment when any is given). |
| | | | District. | Mauza. | Village. | District. | Mauza. | Village. | | | | *Arithmetic and Mensuration.* | *Survey.* | |
| | | | | | | | | | | | | | | |

*Register of Mandals.*

| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Mauza | Name of mandal. | Date of appointment. | Approximate age on 1st January 1885. | Date of entering survey school. | Date and class of certificate. | | Date of order of dismissal on account of failure to pass. | Explanation of reasons for examination from attending survey school. |
| | | | | | *a.* 2nd | *b.* 1st. | | |
| | | | | | | | | |

By order of the Chief Commissioner of Assam,

*The 21st October 1884.*

H. Z. DARRAH,
*Offg. Director of Agriculture, Assam.*

# *No. 15 (c).—Letter to the Government of India* re *industrial survey.*

No. 7320, dated the 17th December 1888.

No. 15. Industrial Survey in ASSAM.

From—F. C. DAUKES, Esq., Officiating Secretary to the Chief Commissioner of Assam,

To—The Secretary to the Government of India, Home Department.

I am directed to acknowledge the receipt of your letter No. 14—464, dated the 2nd November 1888, in which you enquire what action has been taken in Assam towards carrying out the suggestions made in paragraph 25 of Home Department Resolution No. 199, dated the 18th June 1888, regarding the completion of an Industrial Survey of the Province and the formation of a Committee for the purpose of dealing with the question of technical education.

2. In reply, I am to forward copy of a letter No. 1861, dated the 11th September 1888, from the Director of Land Records and Agriculture, Assam, which also embodies the opinion of the Inspector of Schools; and to say that the Chief Commissioner is disposed to agree with the conclusions therein set forth. Having regard to the circumstances of Assam and to the undoubted characteristics of the large majority of its inhabitants Mr. Fitzpatrick, while fully alive to the desirability and importance of promoting technical education where this can be done with any reasonable prospect of success, does not think that any advantage would be gained by undertaking an industrial survey of this province or by appointing a Committee of experts and professional men to make suggestions for devising appropriate means of technical education. At the same time the Chief Commissioner will be quite ready to take the necessary steps in this direction, if the Governor General in Council, having considered the matter in the light of Mr. Darrah's remarks, should still wish this to be done; and in any case Mr. Fitzpatrick will not fail to take such action as may seem from time to time possible for the purpose of forwarding the object which the Government of India has in view. He is, I am to say, at present engaged in considering the possibility of devising some better means than the Artizan School at Jorhat, to which Mr. Darrah refers, affords of promoting technical education with the aid of the Williamson Fund.

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No. 1861, dated the 11th September 1888.

From—The Director, Department of Land Records and Agriculture, Assam,

To—The Secretary to the Chief Commissioner of Assam.

I have the honour to acknowledge the receipt of your letter No. 4777, dated 28th ultimo, with which was forwarded for remarks a copy of a Resolution by the Government of India in the Home Department, No. 199, dated 18th June 1888.

2. In reply I have the honour to say that I have consulted the Inspector of Schools on the subject of paragraph 25 of the above Resolution; and we are both of opinion that the suggestions therein contained have no practical bearing on the circumstances of this province. The only valuable product of Assam which cannot be manufactured without a certain amount of technical knowledge is tea. But as the Assamese are too indolent and too well off to profit by the facilities for learning this industry which already exist, they are unlikely to resort for the purpose to technical schools. All the other exports of any importance are either direct agricultural products, like mustard, requiring no manufacturing process at all, or are universally made by all classes of the people, like silk cloths, and are therefore so generally known that it would be quite useless to start technical schools to teach them manufacture. There are other articles made in the province, such as bill-books, in many districts, lacquer-work in Sylhet, gold jewellery at Barpeta and Manipur, ivory articles at Jorhat, all of which require a certain amount of technical education, but which are certainly not of sufficient importance to justify the establishment of a special school. If there were any need for anything of the sort, there would be no difficulty in obtaining apprentices. But as a matter of fact apprentices are not, as far as I am aware, to be had in Assam. A school for teaching carpentry and blacksmith's work exists in Jorhat; many, I understand, of the boys are paid for attending, and a number of those who have passed through the school have gone back, Mr. Willson says, to the customs of their fathers and resumed fishing and agriculture as a means of livelihood. Even in Government offices, the clerkships of which are so much in demand, apprentices can scarcely be had except on a monthly salary, whereas in Upper India there are always more apprentices available than there are vacancies for them to fill.

Under these circumstances I would submit that there is nothing to be gained by an industrial survey of the province. We know already what arts and industries exist. So the survey, if undertaken, would teach us little that is new. The main want of the Province is a larger population; and until this is obtained nothing in the way of schools or Committees will do much to advance its welfare.

# COORG.

## *No. 16—Report on the industries of Coorg.*

No. 16.
Industries of
COORG.

No. 2236—685, dated the 21st December 1888.

From—F. E. K. WEDDERBURN, Esq., Secretary to the Chief Commissioner of Coorg,

To—The Secretary to the Government of India, Home Department.

I am directed to acknowledge the receipt of letter No. $\frac{14}{469}$, dated the 2nd November 1888, from your office, inquiring, with reference to paragraph 25 of Home Department Resolution No. 199, dated the 18th June last, what action has been taken in Coorg towards carrying out the completion of an industrial survey.

2. I am to forward a copy of letter from the Commissioner of Coorg, No. $\frac{601}{355}$, dated the 12th December 1888, on the subject; and to say that the Officiating Chief Commissioner concurs with the views expressed therein by Colonel Clarke.

No. 601—355, dated the 12th December 1888.

From—COLONEL T. G. CLARKE, Commissioner of Coorg,

To—The Secretary to the Chief Commissioner of Coorg.

I have the honour to acknowledge the receipt of your letter No. 2056—685, dated 21st ultimo, calling for a report as to what measures should be taken to give effect to the suggestion made in paragraph 25 of the Resolution of Government of India (Home Department), No. 199 of 18th June last, for the completion of an industrial survey of Coorg.

2. No action was taken by me in this matter on receipt of Sir A. Croft's report, copies of which were received under cover of your office endorsement No. 1644—685 of 7th September last, as the report was communicated to me for information.

3. In the paragraph above quoted, the Government of India enunciates the view that technical education of a special kind should be promoted in such manner as can be most advantageously "applied to the service of existing industries which will profit by the aid of scientific research, scientific method and higher manipulative skill." The Government of India accordingly directs information to be obtained as "to the extent, character and circumstances of important local industries," an industrial survey being carried out for this purpose in every province.

4. I have carefully considered the matter in the light of the information which has been previously collected in regard to existing industries in Coorg. In 1884, instructions were received to prepare lists of artware and manufactures in the province; and in this office letter No. $\frac{868}{202}$ of 12th December 1884, my predecessor, Colonel Hill, submitted a full report on the subject. He remarked that the several industries (of which the list appended is a copy) are "of the simplest and most rudimentary character, such as are common in villages throughout India, and are not such as to be regarded as worthy of any description.

5. The list comprises—

(1) The manufacture of Coorg knives and swords which, under existing circumstances, are worn only on gala days and on occasions of ceremony. The manufacture is now very limited; and from this cause the persons engaged upon it are very few.

(2) *Basket-work.*—Rattan boxes were formerly used largely in the country for holding clothes, account books, etc. They are being rapidly superseded by boxes and trunks of foreign manufacture, and this industry is also on the decline.

(3) *Pottery.*—This is of the commonest description.

(4) *Metalware.*—This industry calls for no special notice. It is limited to the manufacture of copper, brass, and bell metal vessels, such as are made everywhere. There is no special artware in gold and silver work.

(5) *Textile fabrics.*—As stated in the Annual Report for 1885-86, the manufacture of cloths, wholly cotton, is confined to a few villages in North Coorg. The industry does not exist in Coorg proper.

6. The above is a concise but complete category of the industries which exist in the province. The list, I may add, underwent very careful investigation by the Local Committee which was appointed to collect exhibits from this province for the Colonial and Indian Exhibition in London in 1886, and over which I presided. I feel assured, therefore, that nothing would be gained by a further enquiry. Coorg may be described as being at present devoid of any important industries; and if its condition in this respect is exceptional, the circumstance is due to the Coorgs being a purely agricultural class. There are no mechanics among them, and all the artizans in the country are non-Coorgs. The Coorgs pride themselves on being simply agriculturists, and are dependent on others for every thing they need that calls for technical skill.

7. With the spread of intelligence and education, however, the Coorgs are, I believe, beginning to see the importance of introducing technical education; and a great boon would be conferred upon the people if the means were afforded to them of learning mechanical trades. Their price may stand in the way at first; but the more sensible among them will soon learn to appreciate

the advantages of such an education for their children, in preference to the book learning, which, in many cases, cannot be made lucrative and too often results in that half knowledge which is worse than useless.

8. The proposal I would make is that technical education should be made a part of the ordinary course of instruction at the Mercara Central School. Every boy should be made, unless he can show good reasons to the contrary, to learn carpentering and other practical mechanics' work. There are in Coorg no caste prejudices to come in these matters; and I think it will be found that the instruction will come to be highly appreciated.

9. The Inspector of Schools is now absent on tour in the Mangalore District, and I am unable to consult him personally; but I feel no doubt that he would assent to the view I have expressed that no difficulty will arise if attendance at a workshop is made compulsory on all the students should such a measure be decided upon.

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## LIST OF MANUFACTURES IN COORG.

### Arms.

1. The Coorg knife, *Pitche Kattei,* with ornamented handle and sheath is one foot long and $1\frac{1}{2}$ inches broad, worn mostly as an ornament in the cloth (Kumerbund) tied round the waist. The blade is made of inferior steel. The handle is made usually of silver or ivory. The sheath is made of bamboo or black wood and is heavily mounted with silver. The value of silver used in the handle and mounting costs R10; occasionally the knives are mounted also with gold, costing R35 extra. The massive silver chain with silver tassel and chatelain and smaller chain, which depend from the sheath, cost R25.

2. The Coorg sword (Udakatti) without sheath, but with an ornamental waistbelt and a spike behind into which the sword is fastened, is 2 feet long and 4 or 5 inches broad. It is a powerful weapon, and is used now chiefly for killing pigs. The blade is made of inferior native steel, the handle is generally made of horn. The spike at the back is made generally of brass, occasionally of silver. The belt is made of red cloth mounted with silk and embroidered in gold with silk cords.

Ten artizans are employed in making these Coorg weapons. The outturn is estimated of the value of R1,000 yearly.

### Basket work.

1. Ordinary bamboo upon baskets for holding grain and coffee.
2. Ordinary bamboo sieves for sifting grain, etc.
3. Rattan boxes for holding clothes and accounts, with moveable lid which fits over.
4. Small basket trays.
5. Small rattan shields.

About 150 persons are employed on basket work in Coorg. The value of the work is estimated at R1,500 yearly.

### Pottery.

1. Ordinary round earthen waterpots, earthen cooking-pots, pot-tiles and goglets.

2. Large flat Mangalore tiles, manufactured at Mr. East's Pottery works, Mercara. Puddled by machinery after an admixture, one of sand with four of the black coloured clay, obtainable a foot under the surface in low-lying ground in Mercara. Number of tiles manufactured yearly R2,00,000 at a cost of about R10,000.

3. Flowerpots and pipes manufactured at the Pottery.

The potters of the country who reside at Gadinad, Horur Halerinad, Madigerinad, Padinalknad, Kueyengirinad, Bepunad, Hathugatnad, Bettiethnad, Kodli Hobli, Bilahada Hobli and Nidta Hobli, number 233. The number of persons engaged at Mr. East's Pottery are returned at 7 artizans and 49 coolies.

### Metal works.

1. Small bell-metal drums are made for use as musical instruments by the Coorgs, and cost R5 each, giving employment to five persons.

# BERAR.

## *No. 17—Letters* re *industrial survey.*

No. 17 BERAR.

No. 198-G., dated Hyderabad Residency, the 28th May 1889.

From—F. L. PETRE, Esq., Secretary for Berar to the Resident, Hyderabad,
To—The Secretary to the Government of India, Home Department.

I am directed, in replying to your No. 144, dated the 21st March 1889, to express the Resident's regret for the delay which has occurred and which has been owing to the necessity for references to the local officers in Berar.

I am now to forward copies of the Commissioner's No. 690-G., dated the 1st May 1889, and its enclosures.

2. Mr. Howell concurs generally in the views expressed by the Commissioner, but remarks that in his letter, and still more in those from the Deputy Commissioners, there seems to be some misapprehension which might have been corrected by a careful perusal of paragraphs 22 to 26 of the Home Office Resolution No. 199, dated 18th June 1888.

3. Technical education, the Resident would remark, is not so much concerned with the introduction of new industries as with the improvement of those already existing, and there is therefore as great a field for technical education in Berar as in any other province in India. The people of Berar need good carpenters, good blacksmiths, good shoemakers, and good weavers as much as the people of Bengal, Madras or Bombay, and as wealth and population increase, the need of good work and good workmen will increase proportionately. Indeed the development of the cotton industry in Berar points especially to the need of improved mechanics and mechanical appliances.

4. The problem to be solved is how the Government can improve these trades without injuring the independence of the work people and without weakening the self-supporting element which is the mainspring of all trade. Mr. Howell thinks the Government can best do this indirectly (1) by largely increasing the facilities for and inducements to primary education—for primary education is the best basis for technical education; and (2) by improving and enlarging the character of primary education, which in all primary schools should include drawing and the knowledge of common things.

5. The Government can also do this directly—though this is a more hazardous operation—by establishing trade schools, say, at the head-quarters of each district.

The risk of such schools is lest any kind of amateur work or feeling be encouraged, or lest the strictly self-supporting trade element be lost sight of. If these risks can be guarded against, and if such schools can be kept up strictly as training schools where the artizan class will be trained for its work by better methods, tools and appliances, and not spoiled for its work by easy hours or indifference to paying results, then such a system of schools will be an unmixed good. Mr. Howell has long thought that it is the proper business of Government, in the matter of education to take first primary education under its special charge and then to follow this up with a suitable system of technical education, the object of both being, not to raise any class of the community above its hereditary and natural work, but to improve it for that work. When this is done, and sufficiently done, then it will be time enough to provide higher general education for the few who have exceptional talents to profit by it, or exceptional means to pay for it for themselves. The mistake of our educational system, notably in Bengal, appears to him to have been that, while primary and technical education have been neglected, higher education has been profusely, and indeed extravagantly, provided, and our so-called higher education—a poor smattering at best—has been as injurious to the natural career of the artizan and agricultural classes as it has been destructive of their religious beliefs. The mistake has been fostered, and very ably defended by the Educational Departments in all provinces, and it needs only a glance at the constituent members of these departments to understand how this is so. If the salaries of the imported and higher officials, who represent higher general eduction, be compared with the salaries of those who represent primary and technical education in our Educational Departments, the comparison will account very largely for the tendency of our educational systems.

As, however, the great importance of technical education is now forced upon us by the growth of the agricultural population up to the limit of our agricultural resources, and as the Government of India have formally recognised the new departure in the Resolution already cited, in all of which Mr. Howell cordially agrees, he ventures to hope that, in Berar, at all events we may retrace our steps and endeavour to attain, by our future educational system, more intelligent, better trained, and therefore more efficient production.

# *No. 17 (a).*

No. 690-G., dated the 1st May 1889.

From—T. CHICHELE PLOWDEN, Esq., C. S., Commissioner, Hyderabad Assigned Districts,
To—The Secretary for Berar to the Resident, Hyderabad.

**No. 17 (a). BERAR.**

In your letter No. 3223, dated 19th November last, forwarding copy of Home Department Resolution No. 199, dated 18th June 1888, you directed attention to paragraphs 20—25 of the Resolution and asked in particular for an expression of opinion "on the subject referred to in the 3rd clause of paragraph 25."

2. In this clause the Government of India make two propositions, first, that in order to collect information as to the extent, character, and circumstances of important local industries in India an industrial survey of each province should be completed; and, secondly, that a standing local committee of educational experts and professional men should be appointed in each province to turn to account, in the various ways suggested in the Resolution, the information acquired by the survey.

3. On receipt of your instructions, I called upon Deputy Commissioners to institute an enquiry each for his own district, and to report upon the extent, character and circumstances of important, local industries, leaving aside, for the present, the question of organizing a standing committee. I now enclose copy of the replies received from the Deputy Commissioners of Amraoti, Akola, Wun, Basim and Buldana. The answer is practically the same from all districts, *viz.*, that there are no special industries, but that the usual indigenous trades—carpentry, blacksmith's work, shoe-making, weaving, pottery, dyeing—are all more or less represented in the principal villages. There are, however, two special industries which owe their origin to the growth of the trade in the staple produce of Berar, *viz.*, cotton. These industries are cotton-ginning and cotton-pressing, and to them may be added a third, *viz.*, cotton-spinning and weaving, though as yet this last is represented only by one mill at Budnera on the Great Indian Peninsula Railway, near Amraoti; and it should also be noted that some of the ginning factories give additional employment to their machinery by working oil-mills with it. Berar, as is well known, is essentially an agricultural province, and the industries connnected with cotton are the only ones of a special character which at present exist. But Berar differs from other agricultural countries, *i.e.*, those in which agriculture is chiefly concerned with the production of food-grains, in that the staple produce is cotton, and consequently there is an ample field for establishing on the spot manufactures connected with that article. Another industry susceptible of development under favourable conditions is coal-mining in the Wun District.

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|---|---|---|
| Wun | No. $\frac{359}{120}$, | dated 15th February. |
| Basim | ,, 919, | ,, 12th April. |
| Buldana | ,, 976, | ,, 11th ,, |
| Akola | ,, 183, | ,, 13th ,, |
| Amraoti | ,, 297, | ,, 15th ,, |

4. The measures undertaken in Berar for the encouragement of technical education should, I think, be directed to the establishment of trade schools both for the improvement of the common indigenous trades in which a very moderate degree of manipulative skill has as yet been attained and for teaching mechanical industries with special reference to trade and manufactures connected with cotton. And, thirdly, for teaching higher agricultural and veterinary science with particular reference to cattle. With regard to the first of these—a school for improving the ordinary trades—a beginning has been made with the opening in February last of Mr. Fuller's Artizan School at Akola. If a standing committee is appointed for Berar, it might be located at Akola, which as a convenient central spot, I should make the educational head-quarters of the province. The Director of Public Instruction for the Hyderabad Assigned Districts resides there, and besides Mr. Fuller's school there is a High School. And when the through line to Calcutta *viâ* Nagpur is opened, it is possible that Akola may become an important depôt of the Great Indian Peninsula Railway, with railway work-shops which could be turned to account for educational purposes.

# *No. 17 (b).*

$\frac{\text{General No. 25,}}{\text{Department No. 120}}$, dated the 15th February 1889.

From—H. DEP. RENNICK, Esq., Deputy Commissioner, Wun District,
To—The Commissioner, Hyderabad Assigned Districts.

With reference to the fifth question contained in your letter No. 428 of the 26th ultimo, regarding the industrial survey of the district, I have the honour to remark that, according to the last census, this district contains only a rural population of 201,490 males and 190,611 females, with a little over 100 persons per square mile—100·35. For the purpose of this report, I leave out the number of females and also eliminate boys under 9 years of age who are not ready for technical education and men over 45 and upwards who are past the age for the reception of the same. Of the former there are 57,195 and of the latter 30,470, and these comprise all the known castes there are.

2. The industries of the district consist of articles of necessity manufactured by potters, stone-cutters, weavers, carpenters and blacksmiths, and in articles of luxury made by white-smiths, bangle, and scrubmakers—in fact, they may be counted on the fingers of both hands. Tradition does not inform one that this district was celebrated for any particular manufacture, and the implements of trade are now what they were a century ago, for the simple reason, that the people

lack in originality, perception of design and prospective. The proof lies in the ancient ruins of the temples, throughout the country, where not a single arch would be seen, nor a statue or fresco which though elaborately executed are incorrect in outline and proportion.

3. People go into ecstacy about Mooltan pottery, Cutch work, Vizaz carving and so forth, which after all are crude outturn unable to stand the scrutinizing eye of a European artisan. Again, one hears so much about the factories in India, such as cotton, sugar, oil, paper, and other mills: remove the driving wheel and the master hand, where will the factories be? It would be worth consideration whether the owners should not pay 100 per cent. duty on a new wheel they may wish to import.

4. I am of opinion that England should be the workshop of the Empire, and India its granary. It will be futile to attempt technical education on a large scale in the mofussil. There are some classes who will not take to it. The artisan classes will certainly come forward. Regarding this, in my letter No. 2057—653 of 5th December 1887, I suggested that boys at the schools at head-quarters, where there is always a Department of Public Works or Local Fund officer, should have a few hours' training under the maistry, who would receive a capitation allowance at the end of the year after the boys had gone through an ordeal of examination. The successful boys, unlike the apprentice at Home who pays for his tuition, might receive a money grant as an encouragement.

5. The Railway workshops are good schools to turn out artisans who have improved in their work, and it is a question whether the State could undertake instruction on a large scale in handicrafts without an enormous outlay, which the result would not justify. I would beg to conclude by stating that the extent of the industries in the district is limited and their character simple.

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## *No. 17 (c).*

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No. 919, dated Basim, the 12th April 1889.

From—H. B. KNOWLYS, Esq., Deputy Commissioner, Basim District,
To—The Commissioner, Hyderabad Assigned Districts.

With reference to your No. 6412, dated 6th December last, asking for a report on the extent, character and circumstances of important local industries in the district, I have the honour to state that the only industry in this district is weaving, and I shall be able to furnish information shortly, *viz.*, the number of looms and the general outturn. The weaving consists simply of common saris, value of about R2 each, dhoties of small value, and khadi or coarse cloth; also turbans of a common and cheap description prepared by Momins.

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## *No. 17 (d).*

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No. 976, dated Buldana, the 11th April 1889.

From—H. SZCZEPANSKI, Esq., Deputy Commissioner, Buldana District,

To—The Commissioner, Hyderabad Assigned Districts.

With reference to your letter No. 6412 of the 6th December 1888, I have the honour to report that there are no local industries in this district, save at Nandoora in the Malkapur Taluk, where dyeing cloth in red for the use of native women is extensively carried on; the cloth used for it is mostly product of English manufacture, and the stuff used in dyeing is roots of plant called "a" which is grown in the country.

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## *No. 17 (e).*

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No. 183, dated Akola, the 13th April 1889.

From—F. W. GRANT, Esq., Deputy Commissioner, Akola District,
To—The Commissioner, Hyderabad Assigned Districts.

In reply to your No. 1614, dated 8th instant, I have the honour to state that the Tahsildars have been addressed with a view to their collecting and furnishing the required information, but this will necessarily take time, and I shall probably not be able to answer the reference until perhaps another month.

2. I would beg, however, to refer you to the last Census Report of Berar, which contains all the data asked for. Table No. XII, Appendix E, at page 149 of the Report, gives in detail the occupations followed in Berar, and at pages 190 to 196 in the body of the report there is an account of the industrial classes. That information still holds good.

3. And as regards this district, no special action would now seem to be neessary since an Industrial School has been already established at Akola. In this institution the pupils are taught carpentry, shoe-making, blacksmiths' work and tailoring, and in my opinion it fully supplies, for the present at least, the requirements of the district.

# *No. 17 f.*

No. 297, dated the 15th April 1889.

From—A. ELLIOTT, Esq., Officiating Deputy Commissioner, Amraoti District,
To—The Commissioner, Hyderabad Assigned Districts.

I have the honour to acknowledge receipt of your letter No. 1614, dated 8th instant, on the subject of an Industrial Survey of Berar as called for in your letter No. 6412, dated 6th December 1888.

In reply, I have the honour to report that the result of enquiries in this district is that there are really no special industries carried on here. There are the usual class of trades found more or less in every large village. Dyers and weavers, carpenters and blacksmiths, tailors and shoemakers, etc., etc., but there is no special industry carried on in this district.

The only industries not indigenous are cotton-pressing, cotton-ginning and cotton-spining and weaving, as at the Budnera mills, and these do not require any assistance from the State.

# BENGAL.

## *No. 18.—Report on the Arts and Industries of Bengal by Mr. Collin.*

No. 170, dated the 4th March 1890.

From—H. W. C. CARNDUFF, Esq., Under Secretary to the Government of Bengal, General Department,

To—The Secretary to the Government of India, Home Department.

**No. 18. Arts and Industries in BENGAL, 1889.**

With reference to the correspondence ending with your letter No. 312, dated the 13th July last, I am directed to submit, for the information of the Government of India, the enclosed copy of a report* by Mr. E. W. Collin on the existing arts and industries in Bengal, and to say that the proposals made in the report are under the consideration of the Lieutenant-Governor.

* No. 40, dated the 4th January 1890.

No. 40, dated the 4th January 1890.

From—E. W. COLLIN, Esq., on Special Duty,

To—The Secretary to the Government of Bengal, General Department.

I have the honour to submit the following report on the existing arts and industries in Bengal called for in Mr. Buckland's letter No. 537, Education, dated the 6th August 1889.

Instructions.

2. The instructions given to me were the following:—

(1) to ascertain by local investigation the principal local arts and industries existing throughout the province, and to report in which of them increased skill is attainable, and by what means in each case the necessary improvements can be effected;

(2) to ascertain whether any native industries are of sufficient importance and vitality, and sufficiently centralized, to be likely to benefit by the establishment of schools of instruction in the theory and better practice of such industries.

A period of four months was allotted for the inquiry, and no suggestions on the subject of the Sibpur Engineering College or the Calcutta School of Art were required.

The instructions were based on the suggestions contained in paragraphs 24 and 25 of the Resolution of the Government of India in the Home Department, No. 179, dated the 18th June 1888, to the effect that, in order to expedite the development of technical education in India, a survey of existing industries should be first undertaken; and secondly, a committee of educational experts and professional men should be formed in order to turn the knowledge acquired by the survey to the best account. The instructions given to me contemplate the carrying out of both the tasks prescribed by the Government of India, and if the proposals made in this report for the development of technical education in Bengal are incomplete or impracticable, I must plead for indulgence as not being specially conversant with art subjects, nor an expert in manufactures.

Division of report.

3. I have divided the report into two parts. The first part will be occupied with the survey of industries and arts in Bengal, and the second will treat of the manner in which improvements may be effected by the introduction of technical education. With regard to the survey, I have considered each industry with reference to its importance, extent, and vitality. I have not thought it necessary to give details of the processes of manufacture. In most industries such details have already been given in various reports, and it is not necessary to reproduce them. I have in the course of my tour visited all the chief places, where the different arts and industries are specially vigorous, and as the Bengal Government appear to attach importance to local enquiries, I append extracts from my diary. This will prevent the introduction of excessive detail in the report.

Agriculture and raw products excluded.

4. I have omitted the subject of agriculture and the manufacture of raw products. A scheme for agricultural education has been put forward by the Director of the Department of Land Records and Agriculture, and the papers are before Government. It would be presumptuous for me in the short period of my deputation to take up this subject. The manufacture of sugar affords a wide field for inquiries, but at this season of the year it would be useless to undertake them. The cultivation of the silkworm and the manufacture of raw silk is under investigation by an association in Berhampur, and M. Pasteur's methods for eradicating disease have been introduced with fair success. This industry, therefore, may be passed over. An industry such as the manufacture of indigo does not fall within the scope of my inquiries. The interest of the manufacturers is sufficient to guarantee that the best methods are introduced, though it may be noted that, so far as I am aware, there is no scientific knowledge of the process of manufacture, nor of the causes which tend to the remarkable variations of produce in different soils and conditions of climate. The manufacture of shellac is such a simple process, and has been carried on by both Europeans and natives for so long, that I have omitted it. The chief seat of the industry is Bankoora, where at Sonamukhi there are 75 factories employing over five thousand persons for a part of the year. In Chota Nagpore, Gya, and Beerbhoom there are also numerous lac factories.

Veterinary science and dairy produce excluded.

5. Veterinary science is entirely neglected in Bengal, but a scheme for the establishment of a college has been laid before Government by the Director of the Department of Land Records, and it

is not necessary to say anything on the subject. Butter, ghi, and cheese-making are industries which also fall within the scope of that Department. A great deal might be done to improve the manufacture of butter and ghi. Nearly two lakhs of rupees worth of ghi are exported from Purneah and Bhagulpore, where the Kosi jungles afford large grazing grounds. The total yearly value of the milk in these two districts has been estimated at forty lakhs of rupees. The Juanshahi district of Dacca is also famous for cheeses. Demonstration dairies might be established, as is done in Ireland, with great effect, and the use of cream separators taught. I notice, however, that an English dairy association has deputed agents to India to bring their improved machines into notice, and this industry may be left to private enterprise.

European industries in Bengal.

6. Before considering the industries of Bengal in which native capital and labour is chiefly employed, it will be convenient to give some account of the mill industries and engineering and railway workshops where European capital is engaged, and where the methods of manufacture and the supervision of labour are imported. There are in the neighbourhood of Calcutta about fifty mill factories and presses which give employment to upwards of fifty thousand natives and to a large number of European foremen. The latter are men who have gone through an apprenticeship in the Dundee or Manchester mills, but who, as a rule, have little beyond a practical knowledge of machinery and the processes of manufacture. There are in Calcutta and Howrah large mechanical engineering workshops, such as those of Messrs. Burn & Co., Mesers. Jeshop & Co., and others. I am not able to give full statistics of the number of men employed. Messrs. Burn & Co. employ from 1,500 to 2,000 native workmen, but their foremen, of whom ten are employed, are always obtained from England. Similar to the foregoing are the railway workshops. The East Indian Railway Workshops at Jamalpore give employment to about 3,000 native workmen with thirteen European foremen. A smaller number are employed at the Carriage and Wagon Workshops at Howrah. At the Kanchrapara and Saidpur Workshops on the Eastern Bengal railway over twelve hundred native workmen are employed with five European foremen. At the Dacca Railway Workshops there are 500 men employed under a European foreman and three native assistants. At the Somastipur Workshops of the Tirhoot State railway there are 800 native workmen under a European Superintendent and two European foremen, and four leading hands, who are locally trained. There are workshops in connection with the canals at Cuttack, Balasore, Midnapore, and Dehree, but they are chiefly engaged in repairs, and the amount of labour employed varies from season to season. In all the foregoing workshops the processes of manual labour are directed by skilled supervision, the best tools and machinery are used, and a large body of highly trained mechanics and artizans is continually at work. It is not necessary to go into any great detail as to these establishments, but they will be considered later on in connection with the subject of technical education.

Mills.

Private and Railway Workshops.

Canal Workshops.

Coal Mining Industry.

7. The coal mining industry of the Raneegunge and Giridih districts is akin to those described in the preceding paragraph. I have not been able to procure any exact statistics regarding it, but there are eight or nine large companies, and several smaller collieries. The industry is still in its infancy and is rapidly increasing. In the year 1885-86 the export from the Burdwan Division was a little over five hundred thousand tons, and in 1887-88 it had increased to nearly a million tons. In the present year there has been an increase of over thirty per cent. Further extension is said to be hampered by high railway rates and the recruiting of coolies for Assam from the mines district. This, however, is not a subject which can be considered in this report. Proposals for supplying trained assistants for colliery management will be made in the second portion of this report.

Native Industries.

8. Turning, next, to what may be classed as purely native industries, in so far as they are independent of foreign influences, it will be found that they are for the most part insignificant. Bengal is almost wholly agricultural. At the last census it was found that only 8·73 per cent. of the community was engaged in industrial pursuits. The greatest number of this class are found in Calcutta and the surrounding districts. Further, it will be seen from this report that, except in such articles as wood-work, brassware, mats, and common pottery, Bengal manufactures have been almost entirely superseded by imports from Europe. In considering native industries, some of them are of sufficient importance to be treated in special detail; others may be treated more briefly. Some of the industries include what may be termed arts, inasmuch as they are concerned not only with the manufacture of articles for use, but also for ornament and decoration, and they will be described together. The principal native industries in alphabetical order are the following :—

I.—Carpentry, joinery, and cabinet-making.
II.—Metalware, including manufacture of iron, tin, copper and its alloys; all kinds of blacksmith's work, cutlery, etc.
III.—Mat-making.
IV.—Leather manufactures.
V.—Pottery.
VI.—Weaving and the manufacture of textile fabrics.

Carpentry and Cabinet-making.

9. There is not much to be said regarding carpentry and joinery which are properly connected with building, and the building trade is not a centralised industry. Cabinet and furniture making are of more importance. It is not necessary to consider the ordinary carpenters, who are found in every town or large village, and who prepare agricultural implements and such rude articles of furniture as natives use. Most districts in the east of Bengal, in the Midnapore district, Chota Nagpore and the Orissa Division are deficient in good carpenters. Schools have been started in Midnapore, Ranchi, and Rungpore to supply this deficiency. In Calcutta there are some 7,000 cabinet-makers, chiefly located

Cabinet-makers in Calcutta.

in Bowbazaar and its neighbourhood, where English furniture is made. These men have been trained in the English shops. Messrs. Lazarus & Co. employ about eight hundred. In the Hughli district near Chandernagore there is a colony of carpenters who work for the Calcutta shops. At Dinapore there are some 200 carpenters who make English furniture and are skilful workmen. In the south of the Mozufferpore district there are a number of carpenters who make palkis, cart-wheels, and other articles of general use. Furniture-making is a thriving business, as the demand among native gentlemen is increasing. At Lalgunge, in Mozufferpore district, *hukha* stems are turned, and the export is over two hundred thousand annually.

In Hughli and Dinapore and Mozufferpore.

Carriage-making.

10. Carriage-making is almost entirely confined to the European firms in Calcutta. A number of carriage builders are engaged at Lohaputti, Bowbazar, Calcutta, and dog carts and palki-carriages are made under European supervison in Patna and Dinapore, where the demand among native gentlemen is said to be increasing. There are about forty families of palki-makers in Patna, and a colony of thirty families of painters (Rung-rez) who paint buildings, carriages, etc.

Wood Carving and Ornamental Wood Work.

11. Carving in wood has almost entirely ceased. It was formerly applied to architecture in many places, and there are evidences in the carved balconies of Patna and Mozufferpore of the former skill of the workmen. In Monghyr there are nine or ten families who work in ebony. They carve articles of furniture, and make boxes and other small articles which are inlaid with patterns in horn of ivory. They do not, however, get much custom, as they are not in a position to push their trade. They will only work in their homes, and the articles made are old fashioned. I saw one man carving the pedestal of a round table for a native gentleman. He was working without a pattern or drawing, and the result showed considerable skill. The ebony is found in the hills near Monghyr. It takes a good polish when rubbed with wax and turpentine oil. I do not know of any other ornamental wood work in the province, but in the Patna Division many skilful carpenters are being taught by Europeans to make delicate articles of furniture from English patterns, and it is said that they acquire great accuracy and finish.

Monghyr wood work.

Metal-ware, Copper and Brass-ware.

12. In metalware, the manufacture of copper and brass utensils holds the first place. It is the one indigenous industry which has not as yet suffered from foreign competition. The extent of the industry may be calculated from the fact that the imports of copper, brass, and zinc in year 1887-88 valued over 90 lakhs, a very large quantity of which must have been locally worked up into articles of use or ornament. In almost every town there are shops of braziers, but more than one-fourth of the total number in Bengal are found in the Burdwan Division. There are over 1,300 families of brass-workers in the Burdwan district alone, and the chief seats of the industry are Sahebgunge, Bompas, Dainhat, Dewangunge, Pubusthali, and Culna. From the Bankoora district over one and a half lakhs worth of brassware was exported in 1887. Patrashair is the chief seat of the industry. There are a large number of braziers in the Midnapore district, near Ghatal and Tumlook, and at Bali in the Jehanabad subdivision. The export in 1886 was over thirteen lakhs. Kharar, in Midnapore, employs daily five thousand men, and is famed for its bell-metal ware. In the Hughli district over 500 families are employed—at Bansberiah and Khamarparah and the neighbourhood. From Nowabgunge and English Bazar in Maldah, brassware to the value of a lakh of rupees is annually exported. In the Presidency division the chief seats of the industry are Santipore, Darmodar, Ranaghat, Moheshpur, Dowlatgunge, and Meherpur in the Nuddea district, Bazrapur and Kesubpur in Jessore. In each of these towns some fifty or thirty firms are engaged. Kagra Bazar near Berhampur is famous for its bell-metal ware, and about twenty-five firms are engaged, each employing eight to ten workmen. In Calcutta there are many firms engaged in Kansaparah, where Babu Tarunath Paramanik has a large workshop. In Karmaparah brass hinges, locks, bolts, etc., are cast. From Cuttack and Balasore there is large export of brassware. Balkati, in Puri is also a seat of the industry. In the Dacca Division the towns of Islampur and Kagmari in the Attia subdivison of the Mymensingh district are best known for their brass work. Over 300 families are employed, and the yearly outturn is ever 2,500 maunds. In Patna it is said that there are about 50 families of braziers, and the yearly outturn is estimated at over a lakh of rupees. In Gya brass work is carried on in several towns, and the yearly outturn is estimated at R30,000. The elegant brass vessels of Nabinagar are much in demand. The west of the province draws most of its supplies from Mirzapur and the North-Western Provinces, but there are a few skilful workmen at Sewan in Chuprah and Jhanjhiarpur in Durbhungah.

13. Each town is famous for some particular branch of the trade. There are some places which make a speciality of casting; others of making beaten-out articles. At Dainhat and Mutiari, in Burdwan, large vessels and cooking pots of beaten metal are made; Dowlatgunge, in Nuddea, is famous for its small cups; Bankoora is famous for its large water vessels; Moorshedabad for the purity of its bell-metal ware. In a few towns, *viz.*, Santipur and Ranaghat, in the Nuddea district, Moorshedabad, Cuttack, and Gya, small figures of gods, etc., are moulded. In Gya town a few workmen are engaged in brasschasing, but the work is much inferior to that done at Benaras. Brass covers for *hukhas* of elegant shape are made in Purneah. In Sewan, Chuprah, there is made a kind of bell-metal ware, called *bedha*. It is made of copper and zinc, and is worked up into supports for *hukhas*, and other ornamental articles. It takes a most brilliant polish, and is much in demand. The business is in the hands of six families. In order not to encumber this report with too much detail, I append a note which gives fuller particulars of the copper and brass industry.

Ironwork and Hardware.

14. Blacksmiths and workers in iron are found everywhere, and are employed in the manufacture and repair of agricultural implements, and other articles of general use. Village blacksmiths are paid in kind, *viz.*, so much grain per harvest for keeping the agricultural implements in repair. There is, however, little original work done, as articles such as spades, ploughshares, axes, nails, etc., are largely imported. In Calcutta, in Bagbazar, there are a number of blacksmiths who make iron platters, spoons, chains, bolts, etc. The Behar and Bhagulpore Divisions contain more than one-

third of the total number of workers in iron in the province. In Patna there are about 400 families of blacksmiths, and the amount of manufactured articles is estimated to be anually over fifty thousand rupees. Iron cages are a speciality of this town. Iron ladles and spoons are made in Kishengunge, Purneah. I am not aware of any other town where blacksmith's work is specially centralized.

Cutlery.

15. In a few places cutlery of a good quality is made. At Kanchanagar, close to Burdwan, is a mistri who supplies knives and scissors to the Stationery Departments of Bengal and Bombay. He is a self-taught man, and employs some fifteen workmen. His workshop consists of three small rooms. He has prepared some special machinery for polishing and sharpening the blades of knives and scissors. These consist of simple discs of metal which work as lather. The knives and scissors are made of cast steel, but the mistri has not much knowledge of tempering. There are two other shops in Kanchanagar started by men who have learnt in the original firm.

At Senhat, in Nuddea, there is one native firm where fairly good cutlery is made. Rough articles of cutlery are made at Lawarpur in the Hajipur subdivision of Mozufferpur, and at Bazitpur n Mymensingh. Knives with horn handles are made in Lohardugga. In Bhowanipore, in the suburbs of Calcutta, are fifteen or twenty mistries, who make surgical instruments and cutlery of extremely good finish; and there is one skilful worker at Chuprah.

Locksmith's work.

16. The manufacture of locks and keys has a special fascination for native workmen. These articles are made in many places on small scale; but at Natagurh, about 12 miles north of Calcutta, there is a colony of locksmiths numbering fifty families, and one firm employing ten workmen. They make English padlocks and keys for sale in Calcutta. The brass pieces are cast in the village of Sukhpore and they are polished and put together by the Natagurh men. The industry was introduced by men who had been trained in the Calcutta shops. Locks, nails, nutcrackers, etc., are made at Baroda and Kalapadre in Banki subdivision, Cuttack, and at Dhulyan in Moorshedabad.

Manufacture of guns at Monghyr.

17. Monghyr has always been famous for its iron workers, and was known as the Birmingham of Bengal. The trade formerly throve in consequence of the iron produced by the smelters in the Kurruckpur district, but it fell off when iron articles began to be imported. The iron workers now find employment in the East Indian Railway workshops at Jamalpore, where over two thousands are engaged. Monghyr is, however, still famous for its manufacture of shot guns. The manufacture was introduced when there was a Mussalman garrison in the fort. The trade has recently largely increased. A fuller account of the industry will be found in paragraph 34 of my diary which is appended. They are now 22 shops, each employing four or five workmen, and the average number of guns annually made is over two thousand. The most remarkable fact about these guns is that none of the barrels are tested before they are sold. I understand that in England all barrels are tested and marked by a Government Inspector. The demand for the Monghyr guns has increased so rapidly that cheap and unfinished guns are being exported, and the danger of bursting barrels is great. The old firms of gun-makers are alive to this danger, and they asked that an Inspector may be appointed. They fear that their trade may be discredited by bad workmanship on the part of the new firms. I ascertained from the Superintendent of the East Indian Railway Workshop at Jamalpore that there would be no difficulty in testing gun barrels in the same way as boiler tubes, and I would recommend that something of this sort be introduced.

Tinsmith's work.

18. Tinsmith's work has become very popular in recent years. Natives have largely taken to the use of kerosine oil, and the old tins are used for the manufacture of lamps and all kinds of useful article. The business is not centralized in any place, but in nearly all large towns a few shops are found. In Calcutta, workmen have been trained in the English shops, and have set up for themselves. There are many native firms where tin sheets are worked up into despatch boxes, etc. Tin work, however, lends itself readily to dishonesty, and competition only will lead to accurate work.

Iron smelting and Burrakur Iron Works.

19. There are a few iron smelters in the Sonthal Pergunnahs near Monghyr, in South Shahabad, and parts of Chota Nagpore, but their production is on a very small scale. The Iron Works at Burrakur are well known. They are furnished with a blast furnance, and give employment to eight hundred workmen. In addition to the production of pig iron, there is a foundry for the making of ornamental iron gates, railings, etc. There are a few foundries in Calcutta, but the only place where there is machinery for rolling iron, is the East Indian Railway Workshops at Jamalpore.

Leather manufactures.

20. The only leather industry of any importance in Bengal is the manufacture of boots and shoes. In Calcutta and the suburbs a great number of shops are engaged in shoe-making. In Bentinck Street is a large colony of Chinese shoe-makers. The existence of European shops and the introduction of the sewing machine has greatly improved the trade. I visited the European firms, and was told that a Bengali shoe-maker could do as fine hand sewing in leather as any European. The various appliances used by Europeans did not seem necessary. Leather harness is also made by natives in Calcutta and the suburbs. The industry has been introduced from Cawnpore. There is a small business in harness and shoe-making in Patna. In Durbhungah some fifty thousand pairs of native shoes are manufactured yearly. The exportation of skins has injured the shoe-making trade, as leather has become more expensive.

Leather curing.

21. Leather curing is carried on by a few factories in Calcutta. In the rest of the province the hides are merely cured sufficiently to allow of their being exported.

Mat-making and Basketware.

22. Mat-making is largely carried on in South Midnapore. There is a numerous colony of mat-makers near Subong whence $2\frac{1}{2}$ to 3 lakhs worth of mats are annually produced. Two-thirds of this amount are exported to Calcutta. The mats are sold in Posta Bazar, Dharmahatta Street. This is the ordinary cyprus matting of Calcutta (mâdur). Sitalputti mats woven of fine reeds are made in

Pubna, Faridpur, and Backergunge, and elsewhere in Eastern Bengal. In the Serajgunge subdivision of Pubna the outturn of these mats in the villages of Tenthulia, Haripur, and Durbast is estimated at half a lakh. There is a colony of Doms at Buranagar, North of Calcutta, who make ordinary rush mattings. In Monghyr a few Doms make mats with a pattern in black and white. Ordinary bamboo mats are made in most district. Palm-leaf hats and braids are made at Diamond Harbour. Baskets are made everywhere. Cane trunks are made in Patna to the value of about R1,500 annually. In the Patna and Bhagulpore Divisions fancy baskets of coloured grasses are made by high caste ladies. In Monghyr fancy baskets are made of *siki* grass and fine bamboo chips woven together with silk or cotton thread. This basketware was much admired at the Melbourne Exhibition of 1881. Good cane-work baskets are made in the village of Maghipara in the Pubna district, and fancy straw baskets are made in the Arrareah sub-division of the Purneah district.

Pottery.

23. The manufacture of earthen utensils is carried on everywhere in Bengal. The best ware is made in the Burdwan district on the banks of the Bhagiruthi, where the clay is specially suited to the manufacture of a durable earthenware. Black earthen jars are exported in large quantities from the Magura subdivision of Khulna, and are used for storing oil and grain. In Monghyr porous water vessels are made. Ornamental pottery is made at Sewan in Chuprah, and is remarkable both for its shape and decoration. It is an imitation of the Azimgurh pottery. The vessels are baked in earthen jars so as not to come in contact with the flames, and when so baked are black. They are then glazed with a mixture of clay (found at Khadoobagh in the Sewan subdivision and Gowandari in the Gapalgunj subdivision) and fuller's earth. The mixture is combined with mango bark, and, when dried, is powdered up, mixed with water and applied as a glaze. The patterns for decoration are copied from designs supplied by Europeans. There are, however, only four families of potters. Fancy pottery is also made at Haswa in the Nowada subdivision of Gya district, but it is of poor quality.

Pottery Works at Raneegunge.

24. Messrs. Burn & Co.'s pottery works at Raneegunge are well known. They employ over 600 men. The chief work is the manufacture of bricks, tiles, and drain-pipes. There is, however, a department for the manufacture of *terra cotta* ornamental ware, both vases and for architectural decoration. The manager has trained a few men to draw and model, and they have some knowledge of designing, although they at present do little original work. He commences with a training class for coolie boys, who have a drawing lesson for two hours a day. The rest of the day they pull punkahs. These boys in six months can copy a drawing and enlarge it to scale. They then are trained in modelling, and the manager appeared to find them useful.

No china or procelain in Bengal.

25. Nothing has been done in Bengal towards the production of porcelain or white earthenware There is no opening for this business among Hindus as they think it necessary to constantly change their earthen utensils. After a death in the family, and after an eclipse or any other untoward event, they break all their earthen vessels. Mahomedans are to some extent taking to the use of earthenware cups and plates, imported from Europe, and if they could be made in India, there would be plenty of demand. The difficulty in Bengal is to find the proper clay. Messrs. Burn & Co. have not succeeded in finding it, and are about to set up large workshops at Jubbulpore, where all the ingredients for the manufacture of china and porcelain are available.

Experiments in white china.

26. Ordinary Indian clay contains so much oxide of iron and carbonate of lime that the vessels bake red and do not stand a high degree of heat in baking. In some cases the clay is pure but is mixed with so much vegetable matter that, when baked hard, it cracks and warps. In 1840 Dr. O'Shaughnessy discovered a mixture of a clay from Colgong (*khari*) and *saboon mutti* or dark brown fuller's earth, also from Colgong, which, when mixed in the proportion of four to one produced a dark coloured ware of great durability.

Glazes.

27. The native potters rarely understand glazes. At Monghyr they some time smear the vessels with a mixture of fine clay without fusion Fine black clay found at Chandi-than mixed with river sand containing mica is also used. Another glaze is made of *gabi* or a red clay found near Setakund, which is mixed with water and applied with a cloth. The Monghyr potters also make their ware of a whitish colour by washing it with *khari* or porcelain clay before burning. Black pottery is made by smoking it with oilcake in the kiln. The Burdwan potters use a clay called *belutti* found near Kulna for a glaze. Native potters, however, do not understand the art of fusing glazes.

Weaving and the manufacture of Textile fabrics.

28. The subject of weaving must be divided into three heads: silk weaving, cotton weaving and wool weaving, and it will include dyeing, printing, and embroidery. In silk weaving, foreign competition and a change of fashion has caused a great decline in the industry, while the importation of Manchester cotton goods has in many places caused the weaving of country cloth to cease. On the other hand, my inquiries lead me to the conclusion that, in spite of foreign competition, such of the weaving classes as have survived are as well off as they were at the beginning of the century. Some of the finer work has declined, as it is too expensive for modern consumption. In some places the weaving classes have migrated and have found work at better wages in the Calcutta mills. The position of the weaving classes appears always to have been one of great poverty. Dr. Buchanan Hamilton says of the cotton weavers of Behar at the beginning of the century, that they are in a state of dependence little better than, if so good as, slavery. Of the silk weavers of Maldah, he says that they are extremely necessitous and involved in debt by advances. The fact that they were called upon to carry palkis as a feudal service shows how degraded a class they were. In spite of their difficulties they still exist in great numbers, and at the last census the workers in textile fabrics were more than one-third of the whole manufacturing and industrial class. That they are still fairly prosperous is shown by the fact that I have not found any weavers to whom the expressions used by Dr. Buchanan Hamilton would now apply.

Silk reeling and weaving.

29. As said before, I do not think it necessary to give any account of silk cultivation; silk reeling may be similarly passed over. The industry is carried on in European and native filatures and European managers from whom I enquired informed me that they had tried the various reeling machines used in Europe, but had come to the conclusion that the hand machinery now in use was best adapted to the peculiarly delicate silks of India. Mr. N G. Mukherjee who has seen European filatures could only tell me of one improvement that could be introduced, but this is not yet available, as there is a lawsuit about the patent. Silk weaving may be divided into three classes —(1) weaving mulberry silk, (2) tussar silk, (3) silk and cotton mixed. The weaving of mulberry silk is chiefly carried on in the Moorshedabad, Maldah, and Beerbhoom districts, and at Ghatal, Nimtollah, and Despur in Midnapur. In the village of Bassua, Bhistupur, and Margram in the Rampur Hat subdivision, and in Mirzapur in the Jungypore subdivision of Moorshedabad, there are over 1,400 weavers, and in the Moorshedabad district there are 1,900 families of silk weavers. The best weavers live at Baluchar, Mirzapore, and near Dowlatabad. The value of the outturn in 1875 was six lakhs; but owing to the competition of Japan, China and Italian silks, the industry has greatly fallen off. In Serampore, in the Hughly district, there are over seventy looms. I inspected one firm where some eighteen looms were at work. The weavers work by contract under mahajuns. An account of the weaving is given in paragraph 27 of my diary. It will be noticed that the weavers of Serampore have an improved hand-loom, by which the shuttle is jerked backwards and forwards by a string and lever, instead of being passed between the threads of the warp by hand. The loom is also used in Koykalla in the same subdivision, but I did not find it used elsewhere in Bengal. It works nearly twice as fast as the older loom. It has been in use in Serampore about forty years, and it is remarkable that it has not extended. Its cost is from R16 to R20. There is a further improvement in Serampore in the method of setting up the warp. Instead of using only one bobbin and passing the thread backwards and forwards until the number of threads required for the width of cloth have been arranged, a bobbin frame is used containing a number of reels of thread, so that a full width or half a width of warp can be reeled off at once. The silk woven in Bengal is of a poor quality, as the thread is uneven and thin. It is twisted chiefly by the women of the family without proper machinery. At Meimary and Radhakantpur, in Burdwan, there are some 200 families of silk weavers, who produce annually about R35,000 worth of silk, known as *gorud*.

Improved process of weaving at Serampore.

Silk dyeing and printing.

30. The silks made at Serampore are dyed and stamped locally, as well as in Entally and the Suburbs of Calcutta. There are not more than five or six firms of dyers. The pieces of silk cloth are first bleached with soap and fuller's earth, and are then stamped with various patterns. They are exported as handkerchiefs to Rangoon, Madras, and the Mauritius. Recently the introduction of English cotton handkerchiefs brilliantly dyed with staring patterns has caused this business to decline. There are in Serampore three silk printing firms. The dyes are madder, cochineal, and turmeric. They are fixed by the use of alum and sulphate of iron. Sulphate of iron is locally made by macerating iron in sour *toddy* or rice water. The stamps for printing are carved out of tamarind wood by some artists at Nawabgunge, in the Barrackpore subdivision, and show great skill. The object of the printers appears to be to make the colours as brilliant as possible, and the results are not pleasing. At Bisshenpur, in the Bankoora district, there are about 25 families of silk weavers. The chief artist is Koylash Chunder Rajak, who has three looms, and who is extremely skilful as a dyer. He prepares his own vegetable dyes, makes his own silk thread, and weaves the cloth. Other weavers use aniline dyes, and the use of vegetable dyes is becoming uncommon. The preparation of red dye from shellac has become unprofitable, and the export of safflower from Dacca has almost ceased. A full description of vegetable dyes is given on pages 267—271 of the 2nd volume of Dr. Buchanan Hamilton's History of Eastern India. The subject has also been fully treated in Mr. M'Cann's report.

Pictured silks of Moorshedabad.

31. As a special branch of silk weaving may be mentioned the *butadar* or pictured sari of Moorshedabad. The work is very fine, but on inquiry I found that it was confined to two families. The high price charged prevents any extension of the trade. There is a native firm in Ultadanga near Calcutta who have set up steam looms and make coloured silks for export to Burma.

Tussar silk.

32. Tussar silk weaving is a fairly prosperous business. All Hindus think it proper to wear silk when performing religious ceremonies, and thus there is always a demand for the cloth. European firms are also buying tussar for export. The industry, however, depends upon the supply of cocoons, and as the tussar silk worm is not cultivated, and is only slightly protected in the jungle the supply varies. Latterly the trade has been demoralized by an attempt made by a Calcutta firm to buy up all the cocoons for export. The cocoons are brought from Chota Nagpore, and the silk thread is reeled and twisted by the women of the weaver's family. The chief seats of the industry are Hughli, Bankoora, Midnapore, Manbhoom, Burdwan and Gya. In the south of the Hughli District, some three hundred and fifty weavers are employed. In the Bishenpur subdivision of Bankoora there are about 2,000 tussar weavers. The towns of Bankoora and Birsingpur are also seats of industry. The cloth is often dyed, and aniline dyes are invariably used. The thread is twisted from the reeled silk by women, and it is uneven and full of knots. Hence the cloth woven is of a rough quality. In Burdwan the annual production is estimated at 300,000 yards valued at one and a quarter lakhs. The chief seat of the industry is Mankar, where there are 460 families employed. Roghunathpur, in Manbhoom, has fifty families of tussar weavers, and there is a smaller number at Bhagaya in the Godda subdivision of the Sonthal Pergunnahs. Thirty or forty families in Bunyadganj, Gya district, are estimated to weave about 50,000 yards of tussar cloth annually. In Nowada, in the same district, over a hundred looms are at work for part of the year. In Futwa, Patna, there were till recently over a thousand looms engaged in cotton and silk weaving, but the industry has largely declined.

Assamese silk weaving at Dacca.

33. In the Eastern Provinces cloth is woven of Assamese (*maga*) silk. This is especially used for the manufacture of *kasida* cloth at Dacca. *Kasida* or checkan-worked turbans used to be exported to Egypt, Arabia, and Turkey, where they found favour among the Turks and Arabs. The export formerly amounted to four lakhs of rupees. Machine-made cloths from Europe have ousted the Indian production, and exports have fallen to about a lakh. There are about 3,000 weavers. When the cloth is woven, a pattern stamped is on it, which is embroidered. The embroidery in *kasida* work is done by women, who earn about R2 per mensem. Checkan-work embroidery is done by men. Machine-made embroidery is found to be superior, as the work is more uniform.

Mixed or *bafta* cloths.

34. Mixed cloths of tussar, silk, and cotton, known as *bafta*, are woven at Dacca, Bhagalpore, and Bankoora. The warp is tussar and the woof cotton. In Dacca, cloths known as *azizi* are made of bleached cotton and Assamese silk. The cloth was formerly exported and worn by Jews, but now only a small quantity—about 2,000 pieces—are taken. The weavers are of the ordinary class. In Bankoora there are about 100 families who weave the mixed cloth. The cloth is very cheap, costing only R1-2 to R1-4 for a piece of five yards. Bhagulpuri mixed cloths used to have a great reputation, and there were over 3,000 looms at work. The industry, however, has declined, though in 1887 it improved, and about 40,000 pieces valued at over a lakh, were exported. There are about a hundred and fifty families at Balli and the neighbourhood engaged in weaving *rungina* cloths, and the outturn is valued at over a lakh. Maldah used to be famous for its mixed cloths, but the business is declining.

Cotton weaving.

35. Cotton weaving is carried on more or less in every district, but the introduction of English piece goods has driven the ordinary village weavers to agricultural pursuits. Country-made goods, however, are to some extent in demand, as they are more lasting. The sizing of English cotton goods and the pressure applied to the cloth is said to make them less durable than country-made cloth. In some places, such as Orissa and Chota Nagpore, where communication with Calcutta is difficult, country weavers have maintained their business. In other localities, such as the Burdwan Division and part of the Presidency and Dacca Divisions, the weavers still exist by virtue of their superior skill in particular kinds of weaving. In the Serampore sub division there are said to be 6,000 families engaged in cotton weaving with an outturn estimated at over nine lakhs. They are located in Serampore, Hurrypal, and Khanyan. As noted before the Serampore weavers use an improved hand-loom, and it is probable that they owe the vitality of their trade to that fact. They weave a common kind of cloth which sells at R1-8 per piece of five yards. Near Sheoraphuli in the same sub-division a particularly fine class of cotton cloth is made. At Kulna in Burdwan, there are 500 weavers, and the annual outturn of the district is estimated at over a lakh. In Santipur, in the Nuddea district, about 3,500 families are engaged in weaving *saries* with coloured borders. It should be noted that wherever a weaving industry is centralized, the yarn or cotton twist is imported.

Cotton spinning.

Cotton spinning, except as a domestic industry, does not exist. I find, however, from a lecture of Professor Royle delivered in 1852 that the Indian spinning wheel, though rude in appearance, is singularly well adapted to the purpose, and that it is difficult to improve upon it. The weavers of Santipur can earn about R10 a month. The borders of the *saries* are made of threads coloured with aniline dyes. The borders are now imitated in imported goods, which are sold about four annas a piece cheaper than Santipori cloths. At Chotodhul and Dogachi, in Pubna, are numbers of Hindu weavers who make fine cotton and silk fabrics. The trade has not suffered much from European competition. The cloths are sometimes coloured. The value of the outturn is estimated at two and-a-half lakhs. In Dacca, white cloth with a border of gold thread is a speciality. The cloth is carefully bleached, and commands a high price. The cloth is called *jaladar*. Sometimes flowered patterns are woven in the cloth, when it is called *jaladar jamdani*. The flowered pattern is woven in the warp by a separate thread from that employed in the woof. About hundred persons are employed on this work. Ordinary white cloth without an edging is made in Dacca by about three hundred families. There are forty families of weavers in Bazidpur, Mymensingh, and others at Kishoregunj and Kagmari in the same district. There are about a hundred families of weavers at Bankoora. In Cuttack the largest number of weavers are to be found at Gulnagar, Jonkoti, Kishennagar, and Kathahur. *Dhutis* and *saries* made at Buranagar and Simla, Calcutta, are well known. White cloth is also made at Dhulchur in the Satkira sub-division. In the Barh sub-division of Patna there was till recently a large number of weavers at Bukhtiarpore, Futwa, and Nowada, who made cotton towels, sheets, tablecloths, and coarse country cloth. The former were sold at Dinapur, or exported to Cawnpore. The industry has now declined owing to imports from Manchester. Cotton cloth or *motya*, used by natives in the cold season, is still made in large quantities by Julahars in Patna, Gya, and elsewhere in the Patna Division. The outturn in Gya is estimated at over a lakh of rupees. The cotton for this class of goods is spun locally, chiefly by women. Fine cotton fabrics are made at Kuligram, Maldah, while *kokti* cloths of coarse brown cotton are made in the Jarail and Hati pergunnahs of Durbhungah.

Cotton dyeing and printing.

36. There is a prejudice among the people of Bengal against wearing coloured garments, and, except on ceremonial or holiday occasions, white cloths are preferred. There is consequently very little to add on the subject of dyes. Wherever I went, I found that aniline dyes were being used. It is said that spurious imitations of imported dyes are made in Patna and are sold in the old tins. The chief place where coloured *saril* are made is Chandrakona and its neighbourhood in Midnapore. These are sold in great numbers in the Howrah *sari* market. They are of a very light material, and the colours are effectively arranged in stripes, but decent ladies do not wear them. Further west in the Patna Division calico printing is carried on, especially in Mozufferpore. In Hajipur there was a celebrated calico-printer, but he has gone out of fashion. In Calcutta there are many calico-printers and a few silk dyers in the Mechua Bazaar.

Cotton bleaching.

37. Cotton bleaching is an industry for which Dacca has long been famous. It is this which adds so much to the price of the cotton goods of the town, and I append a note describing the process—Appendix VII. The mixed *azizi* cloths are steeped in water mixed with lime-juice and coarse sugar. The latter article brightens the natural colour of the silk.

Muslins.

38. Muslins are still made to some extent at Dacca. There are five hundred families who make ordinary muslin of English thread. There are only two or three families who make the famous Dacca muslin, which is woven from the country thread. Muslin is made to some extent at Gulnagur, Cuttack, at Behar, Patna district, and at Narajole in Jehanabad, Gya. English thread is used.

Needle embroidery.

39. Embroidery is chiefly found in connection with Santipur cloths. They are embroidered in coloured silks or cottons. The colours are imported dyes. The work is generally done by the women of the family. The arrangement of colours is not pleasing. English cloths resembling Santipuri goods are now imported and sent to Santipur to be embroidered. Embroidered caps are a speciality of Behar, Patna district. Chekan-work is a thriving industry. It is carried on in Calcutta, and there is a colony of 300 chekan-workers at Majirgram in Baraset sub-division, 24-Pergunnahs. The work is exported to Europe, America, and Australia. The sellers in Calcutta have their native agents in Australia, and have recently sent to America to open an agency. Sujni or needle-work embroidery on coloured sheets is a speciality of Puri, and is also carried on in Rajshahye and Maldah.

Carpet weaving.

40. Cotton carpets or satrangis are made at Nisbetgunj, Rungpur, in Patna City, at Obra and Daudnagar in the Aurangabad sub-division of Gya at Sasseram, and in the Mozufferpur district. In the Rungpur district the industry was introduced by Mr. Nisbet, Deputy Commissioner, in 1830. It flourished in consequence of the neighbourhood of the cotton fields in the Garo Hills, but latterly the business has received a serious check, as the price of cotton has almost doubled. This is said to be due to the introduction of cotton-cleaning machines into the Garo Hills tract, which has led to a large export of cotton to Calcutta. The carpets are of large size and are made in coloured patterns. They used to be largely exported. The variety known as *pilpia* (elephant's foot) was special to Rungpur, but some weavers have now carried their business to Dacca. Carpet weaving is carried on in the Sultangunj Mehalla of Patna City, and the annual outturn is valued at half a lakh. Woollen carpets, called *kaleens*, are also made there. In the Gya district there are now about twenty families of carpet weavers. The industry in this district has greatly declined, and there is said to be no prospect of its renewal.

Woollen goods—Blankets.

41. The weaving of woollen goods is almost entirely confined to the manufacture of blankets. This industry is not centralized in any locality, but extends over the Patna and Bhagalpur Divisions as far east as Purneah. It does not appear to extend further eastwards. In the south of Gya there are about seventy families of gareris or shepherds. The outturn is calculated to be about 5,000 blankets annually. In the Mussowhri thanna of Patna there are about thirty families. There are a number of blanket weavers in Purneah, who buy the wool from shepherds. The sheep are sheared twice or three times a year, and the wool of the first and second shearings is mixed to make the best blankets. The cloth is woven in narrow strips which are stitched together. In Purneah the wool is dyed, by using the fruit of the babur tree as a mordant, and after washing in a solution, the wool is covered up in the ground, and a black colour is produced in consequence of the iron oxide in the earth. Superior blankets are made in Aurungabad in the Jungipur sub-division of Moorshedabad. They fetch R8 to R10 a piece.

Art in Bengal.

42. I have now closed the account of the more important industries of Bengal. The minor industries are included in an appendix—(Appendix I). It remains to give a brief account of the few arts which are found, and which have not already been described, in connection with the industries. Bengal is very deficient in arts. They formerly flourished in the shadow of the Courts of Native Princes, and have disappeared with them. Modern Rajas appear more inclined to patronize foreign productions than the arts of the country, and native artists have not adapted themselves to the times. The chief arts are gold and silversmith's work, ivory carving, inlaid metalware, clay models, and glassware, stone carvings, wood carving, shell ornaments, gold and silver embroidery.

Gold and silversmith's work.

43. In gold and silversmith's work the filigree work of Dacca and Cuttack is best known. There are also skilled workers in Calcutta. The silver work of Kurrukpur in Monghyr, where the artizans were introduced by the old Kurrukpur Rajas, is famous. As is well known, native jewellery, so long as it is kept to country designs, is of great merit, but there is a tendency now to imitate English designs which are supplied in the illustrated catalogues circulated by Calcutta jewellers, and this, it is feared, may lead to a deterioration of Indian art.

Ivory carvings.

44. Bengal has always been famous for ivory carvings, and I was disappointed to find that its fame rested on the existence of four families at Azimgunge, Moorshedabad. These men retain the old skill, but they can only work for advances. They are so dilatory in carrying out orders, and their prices are so high, that there is little demand for their productions. There are a few ivory carvers in Barobari, Rungpore district, and in Kendrapara, Cuttack. The speciality of Bengal ivory carving is the minuteness of the work, which requires the assistance of about eighty different tools, and the artists are unwilling to communicate their skill outside their own families.

Metal inlaying—Bidriware.

45. The best known description of inlaid metal in Bengal is the bidriware of Purneah and Moorshedabad. The art was introduced from the Deccan, and consists in inlaying with silver a sort of pewter which is made black with sulphate of copper. It is polished with a fluid made of saltpetre.

sal ammoniac and sulphate of copper. The process of making bidriware has been often described. The art is now confined to four families in Bellori, Purneah, and seven Mahomedans in Moorshedadad. It is now being taught in the Lallbagh Technical School. The chief articles made are hukka stands, plates, spitoons, and cups. They are very expensive, and the workmen are most dilatory in executing orders. They profess to be able to work only two hours a day. This may be due to their devotion to art, but it is probably laziness. There were formerly koftgurs at Monghyr, who plated ironware and did inlaid work. In Bhowanipore, 24-Pergunnahs, there is a small industry called chopping, which consists in overlaying brass articles with silver. This is chiefly applied to harness-buckles, etc. Repoussé work, called *rupsi-kaj*, is also carried on in Bhowanipore, where it was introduced from Dacca.

Clay modellers.

46. The clay modellers of Ghurnia, Kishnagur, are well known. There are four families. The best modeller is employed in the Calcutta School of Art. The chief merit of the models is the life-like delineation of features and the skill in modelling the figure. At present, however, these models rank little above toys. They are made of unbaked clay, and are clad in real clothes and have real hair on their bodies. They spoil very quickly unless kept under glass. It seems unfortunate that so much skill in modelling should be wasted on such ephemeral works of art. Clay models are made at Puri for sale to the pilgrims. Imitation fruits in clay are made in Patna, Arrah, Burdwan, and Dacca.

Glassware.

47. Glassware is largely made in Patna. Bottles for holding perfumery, lamps for illuminations, and glass bangles are made in great quantities out of Sone rivers and mixed with carbonate of soda. The glass is green and clouded. Bracelets of coarse glass are also made at Bhagulpore of Khari or impure carbonate of soda, which is heated till it melts. It is then thrown into cold water, powdered, and again melted. It is then formed into cakes which are melted into rings. This makes a black glass. Green glass is made by adding peroxide of copper, produced by adding salt and turmeric to a moistened copper plate. Blue glass is made by adding an oxide of tin.

Patna glass.

No pure white glass is made in Bengal. Its manufacture requires very expensive plant. All the materials, however, are available in the Chota Nagpore hills. Broken glass is melted down and blown into new shapes by a few men in Calcutta, and there are two families in Patna, who have acquired notoriety by their skill in making fancy glassware. Europeans supply them with patterns which they copy most accurately. They also make coloured glass by the addition of indigo blue, sulphate of copper, or other ingredients.

Stone-carving.

48. Stone-carving as an art is practised in Gya, where there are four or five artists. They are said to have emigrated from Jaypur when the Bishunpud temple was being built. They make small statues of animals and figures of gods. The best artist has recently died. The articles are bought by pilgrims and Europeans, and fetch a good price. The stone is a sort of granite found at Putulkati near Gya, which, when blackened with oil, takes a fine polish. Stone-carving for decoration of temples and buildings has almost entirely died out in Bengal. There are only eight or nine stone-carvers in Calcutta. There is also a small colony of stone-carvers at Laltagiri, about 34 miles from Cuttack. The industry is said to have been introduced by the Mahrattas, but it has made no progress. Images of gods and ornaments for temples are now made to a small extent in conventional patterns.

Wood-carving.

49. There is little to be said regarding wood-carving. It is chiefly confined to a few families at Monghyr, whose work has been already described. The carpenters of Tirhoot and Patna can, however, easily be trained to any kind of ornamental wood-work.

Shell-ornaments.

51. Shell bracelets are largely made in Dacca, where some four hundred persons are employed. Conch shells are used. They are imported from the Madras coast and from Ceylon. The bracelets are sawn out by a large metal disc, shaped like a cheese knife. They are then polished and coloured. All Hindu brides wear these bracelets. Shell bracelets are also made in Burdwan, Bankura, in the Chatmohar town of Pubna (where thirty or forty persons are employed), and in Lohardugga.

Gold and silver embroidery.

52. Gold and Silver embroidery is chiefly applied to caps, and to the trappings of horses and elephants. Moorshedabad and Patna have several skilled embroiderers, and there are altogether about 1,000 men engaged in this work in the latter town. Gold and Silver wire (*kala bathan*) is made in Patna and Moorshedabad in small quantities, but most of the gold thread comes from Benares and the North-Western Provinces.

Improvements of industries by special instruction.

53. The second part of the report will deal with the subject of technical education and the means by which improvements may be effected in the arts and industries of the province. It has been seen that, speaking generally, native industries in Bengal are scattered and unimportant. Only 8·75 per cent. of the population belong to the industrial classes. Some industries are in a decaying condition and are not likely to recover until capital can be induced to take them up. Few industries are centralized in towns. Only 13 per cent. of the industrial population of the province live in towns—a fact which demonstrates clearly how simple the handicrafts and occupations of the people are, and how little they require the superior knowledge and greater capital which are necessary in richer countries. It is out of the question, therefore, to propose any large scheme for the promotion of technical education. It would be useless to attempt to follow the example of the French Government which, with half the population of Bengal, gives £75,000 for technical schools, to which sum must be added numerous grants from municipalities and private associations; nor could anything be attempted on the scale, for instance, of the Guilds and City of London Institute, where £100,000 have been expended on the building of a school and £15,000 are the annual cost, nor of the Cremnitz Weaving School in Saxony, upon which £100,000 have been spent. The elements of an industrial development must be present before measures can be undertaken on such a large scale for the introduction

of special training. The establishment of a technological institute in Bengal has been suggested, but for the present such an institute would be premature. Nor do I recommend the establishment of schools for the higher branches of technical education. The Politechnic schools, which have effected so much for industries in Europe, were instituted at a time when England had almost exclusive possession of the improved machinery invented during the present century. It was, up to 1825, penal to enlist English artizans for employment in Europe, and the export of machinery was prohibited until later. It was to meet this state of things that Polytechnic schools were instituted. Now that a more liberal spirit animates trade and commerce, and the exclusiveness of manufactures has given way, the institution of such schools is unnecessary. It would be easier to depute men to Europe to study the improvements which have been made in the system of manufactures. For the present Bengal must be content to follow in the steps of European progress, and cannot expect to take the lead in improvements. All the proposals which I shall make will be as practical as possible, and such as, in my opinion, are adapted to the different conditions of industries in Bengal. I have not thought it necessary to analyze the Report of the Royal Commission on Technical Education so as to show what is being done for its furtherance in Europe, but the one fact which comes out clearly from the Report is, that there is no settled principle for such training. Each locality adopts a system which is specially suited to its wants, and the same plan must be followed in India. It is useless to attempt to imitate European systems except at a distance. The country in which the industrial conditions most resemble those of India appears to be Ireland. In both countries primary education is backward and not compulsory. In both countries indigenous industries have suffered from foreign competition, and local capitalists are wanting in enterprise for the introduction of new manufactures. The poverty of the people is pleaded as a reason for this want of enterprise, though there are evidences in both countries of large accumulations of wealth. In Ireland, as in India, educated youths are said to be averse to the adoption of industrial pursuits, and the people of the artizan classes are too conservative to accept new methods of work. A perusal of the volume of the Royal Commissioners' Report, in which the Irish evidence is given, will be most useful to the student of the question in India.

**Divisions of technical education.**

54. Before entering upon the subject of technical education, it will be convenient to point out what it means. I find that the definitions of the term are singularly vague. Technical education may be divided into three heads:—

(1) Technical education as opposed to literary, and which is designed to ground a boy in such knowledge as is necessary for the pursuit of an industrial career.

(2) Technical education of a special character which presupposes the existence of some knowledge of a profession or of some training in a particular industry, and which is designed to improve such knowledge or training by the aid of scientific research and better methods.

(3) Technical education in the sense of teaching a trade or profession.

**Technical education of a general character.**

55. The first form of technical education has given rise to much controversy between those who advocate a literary training as the only method of opening and disciplining the mind, and those who would teach only such subjects as are likely to be of practical use. It may be admitted that a good general education is necessary for all who would rise in their profession, while, on the other hand, an exclusively literary training is of little value to boys who intend to adopt commercial or industrial pursuits. It is unnecessary to discuss this question here, but it cannot be denied that there is a strong feeling that in India literary training has been overdone. The complaint is that the Indian educational system does little more than turn out annually a number of youths who are unfitted for any pursuit but that of clerks. The educational system in India is modelled upon that of England—a country of wealthy men of leisure, who can afford the luxury of a training not adapted to enable them to earn an industrial livelihood; but even in England the introduction of a modern side in schools has been found necessary. The Education Commission felt the necessity of giving a more practical bent to the educational system, and proposed that "more variety should be introduced so as to make it more fully meet the needs of a complex state of society." They recommended, therefore, that a modern side should be introduced into certain schools, and that there should be a bifurcation of studies, one course leading to the Universities, the other course tending to fit youths for commercial or non-literary pursuits. The Government of India in a memorandum issued from the Home Department in 1886 noticed this suggestion, and circulated certain proposals to the different Provincial Governments for consideration. The subject had already been taken up by the Bengal Government. It was seen, however, that there would be no chance of success for the introduction of the practical course of studies unless the course had some definite aim, and Mr. Tawney, Officiating Director of Public Instruction, proposed to connect the scheme with the Universities by instituting an alternative Entrance examination in practical subjects. The Calcutta University, however, does not encourage special training until literary education has reached a certain point, and the Senate refused to adopt the proposal.

**Greater extension of primary education necessary.**

56. It is a question whether the Government of Bengal should establish a system of special studies of a general character independently of the Universities and it may be said that one of the first things to be done, even with a view to technical education, is to push on primary education. No one can doubt but that artizans as a body would work more intelligently and to better purpose if they were not entirely illiterate. From the census figures it is found that, of the male population of Bengal, less than 9 per cent. are able to read and write. The industrial class is about $8\frac{3}{4}$ per cent. of the whole population, which includes classes such as Brahmins, Kayesths, Rajputs. These castes alone make up more than 10 per cent. of the Hindu population, and are foremost in education. It is obvious, therefore, how small a percentage of literate persons there must be among the industrial classes, and the provision of greater facilities for primary education is a more immediate want than the introduction of special studies to fit youths of the upper classes for industrial pursuits. Another obstacle to the proposed bifurcation of studies is the want of a definite objective. It would perhaps be valuable for

Civil Engineering students, but for candidates in other professions, would those studies lead to profitable employment? All experience shows that, though technical education may be of great use to increase the value and outturn of skilled workmen, especially when the workmen have received a fair general education, the preliminary training must be practical. No training in a school can supersede the shop. A mechanical engineer's training in England is chiefly a course of three or four years' hard manual labour in the workshops. The practical training must precede the technical. The Madras scheme of examinations in industrial subjects makes a previous practical knowledge obligatory. The result of the introduction of a modern side would probably be to produce a number of half-educated youths for whom it would be difficult to find employment. It is true that something may be done to familiarise boys at school with the ordinary phenomena of nature, and train the hand and eye by the introduction of drawing, as has been done in the Central Provinces; but unless this is combined with a practical training, and is applied to a mind sufficiently instructed to be capable of profiting by such knowledge, it is more likely to impede a boy's general education than to render him fitted for an industrial career. A discussion of this subject, however, does not fall within the scope of this Report.

Technical education applied to existing industries.

57. The second division of technical education is more important, and is what is generally meant by the term. It presupposes the existence of some skill in industrial pursuits, or some knowledge of a profession, and is intended to improve that skill or to increase the knowledge. For instance carpenters are taught drawing, and workmen employed in machinery are taught mechanics, with a view to enable them to work intelligently and not merely by rule of thumb. Another branch of this division is the teaching of design. One of the chief objects of weaving and pottery schools is to teach design, so that new and workable patterns may be introduced. Another branch is the improvement of existing industries by scientific research, as in the case of the production of dyes. Instances of this division of technical education might be multiplied. It is the most important division, and will be chiefly considered in the following paragraphs.

Technical education applied to the teaching of new industries.

58. The third division of technical education, *viz.*, the teaching of an industry or profession, is not properly technical education at all. It is specially excluded from the definition of the term in the Bill which has recently been passed in Parliament for its futherance. In India there is less necessity than in England for Government to undertake the teaching of industries. In England the apprenticeship system has, in most trades, disappeared. In India it still exists. Hereditary handicrafts are handed down from father to son. In addition to this, as any industry or business is introduced into the country, the required artizans are privately trained, and thus technical education in this sense is always at work. The railway workshops, the mills and presses, and the private firms in Calcutta are training yearly a number of handicraftsmen of all sorts, *viz.*, workers in iron, furniture-makers, locksmiths, electroplaters, etc. This training, however, does not reach the educated classes in India, who are required as supervisors and foremen. The latter now in most cases are imported. It is not advisable for Government to teach special trades, but much may be done to give the educated classes of the country an opportunity of taking a share in all such industrial pursuits as are connected with machinery or with manufactures in wood or iron. This subject will be considered in paragraphs 65 and 66. Much also may be done not to teach trades but to encourage the establishment of new industries and manufactures, and more will be said on this subject in paragraph 70.

Means now available for technical education in Bengal.

59. Before entering on the subject of the improvement of existing industries, some account must be given of what has been attempted in the way of technical education by the Bengal Government. In the first place there is the Seebpore College, where an upper and a subordinate class of engineers is trained both theoreticlly and practically. The College undertakes principally the training of Civil Engineers, but workshops are attached, under the Public Works Department, for mechanical students. I gather from the papers forwarded to me that the upper class has admittedly not been successful, and measures have been taken to improve the system of training. The subordinate class is represented as most successful. It contains about eighty students, and they on passing out of the College always find employment under Government or District Boards. From enquiries I found that private firms held a less favourable opinion of this class of students as mechanical engineers. It said that they are not sufficiently grounded in practical knowledge, and it is doubtful if the College can with its present workshops ever hope to be successful in training mechanical students. I need not, however, say more on this subject as, under my instructions, it is not within the scope of my enquiries. The University Course does not in its initial stages profess to include more than literary training, except for the students who after passing the Entrance examination go to the Seebpore Engineering College. For the first examination a small amount of elementary science is required, but a low percentage of marks is sufficient to secure a pass in this subject. After passing this examination, subjects such as physics and geology may be taken up, and the University provides for their study. There is also a course of chemistry, but it is also in the City College that laboratories exist, and there on a small scale. It is obviously difficult for students to study chemistry without facilities for experimentation. In Calcutta there is the S. P. G. Technical School which receives support from Government. In the mofussil there are three survey schools, at Patna, Cuttack, and Dacca. There are industrial schools at Moorshedabad, Midnapore, Bankoora, Ranchi, and Balasore aided, except in the case of the Moorshedabad and Balasore schools, by Government contributions. An industrial school has been recently started at Rungpur under the District Board, and other small private schools exist in the Balasore, Midnapore, and Moorshedabad districts. I have given an account of some of these schools in paragraphs 13, 18, 31 and 38 of my diary. It is only necessary to say here that the first four schools have till now arrived only at teaching a trade. Little has been done to teach improved methods or to combine theoretical training with manual practice. I have already submitted a report to Government regarding the Ranchi school. The Rungpur school is founded on a better system. Educated lads who have read up to a certain standard in the High school, and who are not able to continue their literary course, are admitted, and, in addition to manual labour, are

given lessons in drawing, mathematics, and surveying. It is hoped that a class of intelligent workmen may be trained superior to ordinary artizans, and who will be able to take the posts of overseers in works under District Boards and in Railway workshops. Artizans of this character can earn from R30 to R50 per month. I shall in a later paragraph point out how industrial schools may be made more useful.

Calcutta School of Art.

60. The Calcutta School of Art was established partly with a view to assist the development of native industries, but the institution has not, until recently, accomplished much for industrial art. Within the last few years scholarships have been given by the Public Works Department for draughtsmen who receive a thorough training in the school. Lithography and wood-engraving have been taught, but the demand for this work is not sufficient for the supply of trained students. A few passed students have found employment in photographers' shops for touching up photographs. Some good wood-carving has been done in the school, but there is little demand for this work. The Manager of the Ranigunge Pottery Works has tried some students for designing and modelling ornamental pottery, but he was not satisfied with their work. He said that they had not learnt the value of time, and therefore were valueless from an industrial point of view. The School of Art, however, has, under my instructions, been kept without the purview of this Report, and it is not necessary to say more on the subject.

Technical education applied to mills and factories.

61. In considering what may be done to improve the industries of Bengal, the first in order are the mill, factories and presses in and around Calcutta. Managers and foremen are engaged in England. The machinery is under special engineers and trained English mechanics. From what I could gather in a consultation with the representatives of the mills, there is no indication of any wish to employ either Anglo-Indians or natives as foremen. All that the foremen require is a thorough practical acquaintance with the machinery and methods of work. Few of the foremen now engaged have any scientific knowledge, though some have attended the art classes in England and Scotland. This practical training is acquired by seven years' apprenticeship in the English mills. It is obviously very difficult to introduce any system of this sort for Anglo-Indian or native boys. One of the chief duties of foremen is to exercise supervision over the operatives, and there is a general sense among proprietors that imported Europeans can do this better, and command more respect than either Anglo-Indians or natives. The proprietors are, of course, alive to the advantages of having a local supply of trained youths ready to take the place of foremen, but for economical reasons the present system is considered the best. An Anglo-Indian youth does occasionally get admission as apprentice, but it is hopeless to expect any wide opening of a career to men of this country as foremen in the mills. One difficulty is that apprentices would meet with much opposition, as trespassers, among the foremen from whom they would have to learn their business. Such a difficulty could only be overcome if the proprietors really wished for Indian apprentices. When they do so, the new system will be established without the necessity for any interference on the part of Government. The mill hands require no training. They either begin as boys and pick up the business by degrees, or are persons of the weaver class, who learn their work in a few weeks.

Marine engineering.

62. Marine engineering is sufficiently provided for by the Seebpore College and the examinations of the Port Commissioners. Candidates for the examinations find plenty of private tuition in Calcutta. Anglo-Indians and Eurasians are found on Government steamers. The British India Steam Navigation Company employs only Europeans, and does not approve of Eurasians. Messrs. Hoare, Miller & Co. are the chief firm who employ native engineers on their river steamers. These men have only a practical knowledge of engine driving, and know nothing of machinery. They are obliged to serve an apprenticeship on the steamer for one year as firemen, oilmen, and so on, and then after passing a slight examination they become engine-drivers at from R35 to R50 per mensem. They have no knowledge of machinery, and consequently allow the engines to get out of repair, and cause great expense. This can probably be remedied by a change of the law. The necessity of serving a year's apprenticeship in the discomforts of a river steamer are sufficient to prevent any trained mechanics from leaving the shops where they are employed on the chance of earning the higher pay on a steamer. The evil is not one which affects a large class of the public, and may be left to find its own remedy.

A school for coal mining students recommended.

63. The coal mining industry of the Raneegunge and Giridih districts, described in paragraph 7, is one for which much may be done by way of special training. Coal mining in India is still in its infancy. It is increasing with great rapidity, and, with the extension of railways, more mines will be opened up. At present the coal on the surface only is being worked. None of the mines are more than three hundred feet deep. As the surface coal is exhausted, the difficulties of mining will increase, and greater skill will be required. The more important mines are now managed by European gentlemen with European assistants, who have received mining certificates in England. I met several managers at Raneegunge and the result of a consultation was, that it would be an advantage if trained mining assistants could be obtained in India. I append a note of the result of the meeting—Appendix III. It will be seen that there is ample demand for trained assistants, and it was estimated that, with the extension of mining, there would be from fifteen to twenty appointments vacant yearly. The proprietors of the collieries would be willing to give candidates for such appointments every opportunity for practical training, but they would not be prepared to provide means for the preliminary education. When it is known that appointments of Assistant Managers of Mines, bearing salaries of from R100 to R200 with a prospect of a Managership, are available, there will be many candidates. The only question is whether Government will provide facilities for their education. Such education should, no doubt, be self-supporting, but at first some assistance from Government will be necessary. As to the location of a school for the candidates, Assensole was proposed, but the establishment of a separate school would at first be a great expense. It will be seen from the letter of Dr. Saise which is appended (Appendix IV) that training given at Seebpore will, with certain modifications, suit boys who are to take up mining as a profession. A list of the subjects to taught is given in his letter, and this

corresponds fairly with the course prescribed at Seebpore for the subordinate class. If the course is opened at Seebpore, the only expense would be in obtaining the services of lecturer such as is described by Dr. Saise. On the other hand, the class of youths who would be trained for the mines would be superior to the class from which mechanical apprentices are drawn. It would be advisable to keep the schools separate, and I would recommend that the Hindu School, which Sir A. Croft proposes to close, be taken up for mining students. As soon as the advantages of entering such a profession are made known in the various schools of Bengal, there will be plenty of candidates. For admission, some standard approaching the Entrance examination to the University should be prescribed. This is the standard insisted upon for apprentices to the firm of Messrs. Burn & Co. I would strongly recommend the establishment of a school for mining students as one which would open out a career to the sons of both Anglo-Indians and natives. I have not thought it necessary to propose the establishment of an elaborate school of mines nor of a mining museum. Such institutions do not appear to be required by the present position of the mining industry. It is also unnecessary to propose any scheme for training the labourers or mechanics engaged in the mines, as such training must be chiefly practical, and can be sufficiently learnt by actual work.

Mechanical Engineers.

64. The next question is the training of mechanics and of workers in wood and iron. This is a subject of great importance, and I have consulted many of the chief employers of labour regarding it. It may be divided into two heads—the training of foremen and of ordinary artizans. I have already pointed out, in paragraph 59, that the Seebpore College, though well adapted to teach Civil Engineers, does not give sufficient facilities for the training of mechanical engineers. For men who are to be foremen mechanics, practical training is of more importance than theoretical. Reliance must be placed chiefly on the existing workshops, which have already been described in paragraph 6, and opportunities must be provided for some instruction in theory. It must be remembered that apprentices cannot rise to be foremen merely with the help of technical training. In Europe and England foremen are not selected for their technical knowledge, nor are there any special means for training them, but they are men who by dint of steadiness, intelligence and aptitude for command and organization, have raised themselves from the position of ordinary workmen. For the training of artizans the workshops of course form the best schools for practical work, and an attempt must be made to give instruction in theory. As the existing workshops are not sufficient to supply the demand for skilled labour, they must be supplemented in backward and remote districts by industrial schools. The subject will be more fully considered in the following paragraphs.

Training of foremen.

65. With regard to the training of foremen, it is only in the Jamalpore and Somastipore workshops and in the firm of Messrs. Burn & Co., Calcutta, that there is a regular system of apprenticeships and this only in practical work. In the two first instances, trained foremen were originally brought out from England, but now at Jamalpore the sons of Europeans employed on the railway are being trained locally. They are admitted on passing a simple examination in English and mathematics at the age of 16, and serve for five years. During the period of apprenticeship they are obliged to attend evening classes, not for technical instruction, but as a continuation of their general education. Boys who show a taste for drawing, are allowed to study it in the drawing office. At Somastipore, apprentices of the Eurasian class are trained to be "leading hands"—appointments on R80 to R100 per month. The course is five years, and is entirely practical. No drawing lessons are given. In the workshops on the Eastern Bengal Railway there does not appear to be any system of apprenticeship. It will be seen that the East Indian Railway has set the example of training youths, born in this country, to be foremen, and Government in its State Railway workshops should adopt the same system. As to the inducements to apprentices, there are over 20 appointments in existing workshops which could be filled by men trained in this country, whether Anglo-Indians or natives. There are besides appointments in canal and private workshops and in tea and indigo factories which would be available to youths who have been trained in the Railway workshops, but who fail to find appointments there. Each of these Railway workshops should take in a number of apprentices, and should give them opportunities of learning their work, as is being done at Jamalpore. There would be room for at least fifty youths. The apprentices might be selected by Government from youths who had shown special aptitude in the various local industrial schools, or scholarships might be provided by private liberality. It is probable that the authorities in the workshops would not be anxious to take in apprentices, as they are troublesome and to some extent hinder work; but if the East Indian Railway Company can get apprentices trained, Government will be able to do the same. As to the course of training, apprentices must, before admission, pass a certain standard of examination. After admission they should attend evening classes for instruction in theory. Similar classes might be introduced in connection with the various canal workshops and other places, such as the Kidderpore Dockyard, where apprentices could be introduced by Government. They should also be established in Calcutta, Howrah, and the Suburbs, where there are many youths being practically trained as mechanical engineers. The instances which occur to me are the apprentices in Messrs. Burn & Co.'s firm (there are now 18 apprentices) and those entertained in the Calcutta Municipal Workshops. All the gentlemen whom I consulted were in favour of giving special instruction to apprentices. The Superintendent of the workshops at Jamalpore regretted that he had been unable to introduce it, but the difficulty was to find a qualified teacher. The instruction need not be very elaborate. Drawing at the workshop classes can be taught by the head draughtsman, and a check upon the work can be kept up by examination and submission of the drawings to the Superintendent of the School of Art, Calcutta. There will always be some one in the accounts or estimating branch of the office who can teach the required mathematics. The principles of machinery and machine drawing can be taught by sectional drawings and models under the supervision of one of the engineers. Lectures on scientific subjects and the ordinary phenomena of nature could be given once a week by some one connected with the workshops or by a special teacher. In England private lecturers are generally forthcoming. Examinations might be held, and certificates or prizes granted on the results, not only in the theoretical work, but also in practical, as in the case of the Whitworth scholarships, where some simple test in manual labour is set. Evening classes may seem out of the question in India, but they are even now held for

the Jamalpore apprentices, and, among natives, for firemen and signalmen, who are taught reading and writing and the rules of the Railway. They have been recommended by native gentlemen whom I have consulted, and could at least be held during the long evenings of the cold weather, as is done in England. As to the expense, this would in the first instance fall on Government, but if local teachers can be found, as I have suggested, the cost would not be great. For a small fee the head draughtsman would give lessons two evenings in the week, and in the same way with mathematics. The supervision would rest with the Superintendents or with the Education Department, and there would be periodical examinations in mathematics and science. Books and drawing materials and a building would, of course, have to be supplied, and Government would give prizes or scholarships. In concluding this branch of the subject, I would invite attention to the case of the san-mills of the opium godown in Patna. The Superintendent is willing, if permitted by Government, to take in apprentices from the High School or College, and to give them a practical training in iron work and carpentry, to teach them drawing and estimating, and to give them an insight into machinery. The latter training could be easily taught, as the engines of the mills are being constantly overhauled and repaired. The course should, in the Superintendent's opinion, last not less than two years. Two or three hours a day would be sufficient. The only charge would be an initial outlay for tools and three rupees per pupil as a fee to the Superintendent.

**Training of mechanics and artizans.**

66. The next subject is the training of artizans and mechanics. At present they acquire their skill by an irregular process of apprenticeship. They enter the shops when boys under their fathers, and gradually learn to handle tools and to understand machinery in a practical manner. This kind of technical education is going on in many places, but it is scarcely sufficient to supply the demand for trained labour. Mechanics and carpenters are required for tea and indigo factories, for works under District Boards, and elsewhere. It is necessary to provide increased facilities for training a higher class of artizans, especially in backward districts. I would recommend the establishment of industrial schools at Burdwan, Rajshahye, and Chittagong in addition to those already established. The latter must be placed on a better footing, as will be described in the next paragraph. In addition to providing increased facilities for practical training, opportunities must be given for instruction in theory, both in the industrial schools and in localities where there are a number of skilled workmen employed. The classes which I have suggested in the preceding paragraph for the training of foremen should be made available for mechanics and others. Employers of labour should encourage their most intelligent workmen to attend the classes, and Government or private liberality should provide prizes as inducements to students. The system of examination would be the same as suggested in the preceding paragraph, but the course will be of a simpler character. The Managers of Messrs. Burn & Co., and other leading firms whom I consulted would be glad to see evening classes instituted, where intelligent workmen could learn drawing and mathematics, and could have lectures on technology, machinery, and the elements of natural and physical science. What is required is, that workmen should be given opportunities of obtaining such an insight into the technical details of their trades, as they cannot gather from observation or personal enquiry for themselves. The Dalhousie Institute has been suggested as a convenient place for the classes in Calcutta, and other classes could be started in Howrah and Kidderpore. It would at first be possible to hold them only in the cold weather months, as is done in Europe, but the value of even a short course of lectures has been fully recognized. It has, in fact, been found that drawing sufficient for industrial purposes can be acquired in a very short time. The lectures need not be more than elementary. It must be admitted that the chief employers of labour, although they admit the benefits of a course of theoretical training, do not appear as yet to have felt the absence of it. They look for practical training, and are satisfied with it, if complete. Inconvenience is sometimes felt if a workman has to be sent to a distant place to repair machinery, and he is not able to make or understand a drawing; but this is gradually being lessened by the men learning drawing of their own accord. In conclusion, I must add that it would not be safe to predict success if such classes are established. I am informed that there was a drawing class at the Mint for mechanics twelve or fourteen years ago, but it failed for want of support. The Manager of Messrs. Jessop & Co.'s firm told me that he had attempted to teach the boys in his Works, but they stole his books and papers, and the idea had to be abandoned. These difficulties will be avoided if only the most intelligent and promising artizans are encouraged to attend, by a free admission to the classes, while a fee might be demanded from other candidates.

**Industrial schools.**

67. As I have explained in paragraph 65, the existing workshops are too few and too scattered to accomplish all that should be done for instruction in improved methods of work, and in many localities it appears desirable to establish special industrial schools as well as to improve such schools as have been opened, in which, as I have explained, the training is not of much value. The following principles should be observed in connection with industrial schools. In the first place, industrial schools should not be started where handicrafts are flourishing. An attempt was made to open a school of carpentry at Patna some years ago, but there was no demand for it, and it failed. A similar failure attended the Dacca school in 1880, where the work done was found not to be better than that of the best workmen in the bazaar. The places suggested as suitable for the institution of industrial schools are Ranchi, Burdwan, Rajshahye, Midnapore, and Chittagong. The establishment of small schools by private liberality or in connection with municipalities should be encouraged, as has been done at Moorshedabad, Balasore and Bankoora, and the pupils should pass on to the Government institutions for a higher course of training. Secondly, the main object of such schools should not be merely the training of youths of the ordinary artizan class, but educated lads should be induced to attend. There would be no objection to admitting the sons of ordinary artizans, who would profit by the opportunity of using improved tools and of working under a regular system, but no school should be opened by Government simply for their benefit. Candidates for admission should have attained a certain standard in the schools, and should enter the industrial school with a view of being trained for an industrial career. The inducements to this career should be made clear. District Boards complain of the difficulty of procuring trained labour, and they would provide employment to promising youths. Others might receive assistance

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to enable them to join the Railway Workshops as apprentices or employés. The most promising students should be encouraged to join the subordinate classes at Seebpore. In the schools there should be, in addition to the practical course, a course of drawing, mathematics, and elementary mechanics, and lectures might be given on elementary science subjects. Special trades would not be taught, but the course would include all sorts of manual work in wood and metal, and the theoretical course would teach the principles which underlay such industries. As for the inducements, it may be mentioned that at the Dacca Railway Workshops there is a workman who had a partial education at Seebpore, and who draws a salary of R45 per mensem. When the Dacca school was open, a few pupils found remunerative employment in the Narayangunge Jute Presses. If such appointments are available (and with the development of industries there will be more of them), there ought to be no difficulty in getting pupils for the industrial schools if established at selected localities. Another important principle to be observed in such schools is, that no amateur work or feeling should be encouraged, while at the same time a regular course of training is systematically pursued. As much of the different branches of the handicraft should be taught as is possible in the time. I do not recommend the establishment by Government of industrial schools in connection with either primary or upper schools. These are likely to interfere with the regular educational course, and unless they are something more than recreation classes, they will not foster industrial habits. There is no objection to the establishment of such classes by private benevolence, as they are to some extent calculated to give an impulse to the adoption of an industrial career. It has been seen that the people of Bankoora, Midnapore, and Moorshedabad have taken the lead in the establishment of industrial classes. Such public spirit should be encouraged, but, to make the work real, the classes should be in the main self-supporting. All schools which exist mainly by the payment of stipends to pupils should be discouraged, and Government assistance can be best given by a system of inspection and payment by results. In the case of Government industrial schools, it will be necessary to appoint trained Superintendents. The schools which I saw, except that at Rungpore, had no skilled supervision by a practical man, and I could not see that the training was of much value. In some places, as at Midnapore and Cuttack, there are Superintendents in the Canal Workshops, who for an extra fee would probably be willing to take charge of the schools. At Rungpore the District Engineer and his staff supervise the industrial school. On the other hand, it is in my opinion very important that there should be an officer appointed to inspect these schools. It is necessary to see that real and systematic work is done. The authorities connected with the schools are apt to be over-sanguine as to the results which are being attained, and it requires the eye of a practical man to detect the difference between real and imaginary progress. It would also be the duty of the Inspector to supervise the private industrial classes and to pass the payments according to the results of the work done. Prizes may be given to the Superintendents or students, according to the results of the inspection. The drawing classes should be affiliated to the School of Art in Calcutta, and periodical examinations should be held. The Educational Department will be able to conduct the examination in mathematics and science subjects.

Caste prejudices, etc.

68. It may be doubted whether the introduction of apprenticeships or schools would benefit others than Anglo-Indians and Eurasians. Would the sons of the upper classes of natives be deterred by caste prejudices from entering workshops or industrial schools as apprentices? It is the general opinion that these prejudices are becoming weaker. The justification for the present enquiry is that there is a feeling abroad that literary education has gone too far, and that a more practical training is required. In the various industrial schools which I have visited, I have found high caste boys working with hammer and chisel. The Seebpore College has proved that the upper classes can be brought to work with their hands. One native gentleman, I am informed, went through a regular course of mechanical engineering in an English workshop, and is now training mechanics in his workshop at Moheshgunge. I fear, however, that it will be found that objections, both social and physical, will for a long time prevent the adoption of an industrial career by high caste youths. They are well-fitted for civil engineering, but can hardly be expected to take up mechanical work, even if they are physically capable of it. On the other hand, the old principle of following the hereditary calling of the family is also falling into abeyance, as the sons of mechanics, when educated, often become clerks. This is a very serious danger. It is of the greatest importance to increase and not to lessen the number of educated artizans and mechanics. One reason for the adoption of clerkly pursuits by this class must be the absence of suitable employment. An educated lad cannot be expected to work with ordinary artizans. He requires higher employment, and it ought to be the aim of Government to give him opportunities for practical and theoretical training so as to fit him for such higher work. At present such opportunities can hardly be said to exist. It is in my opinion more important to give men of the artizan classes opportunities of rising in their profession, than to attempt the task of training lads who are, from the circumstance of their birth and disposition, unfitted to adopt an industrial career. Another difficulty is that native lads are said to be unwilling to leave the neighbourhood of their homes. This is particularly the case with Bengalis who live in Calcutta or the neighbourhood. On the other hand, at a distance from Calcutta, the difficulty is to keep an artizan when he has been trained, and, as a District Engineer says, it is only safe to train men who have given hostages to fortune within their districts.

Private firms and Municipal and Local Boards should be encouraged to open schools.

69. The question arises, what is to be done with the pupils who have passed through the industrial schools? So long as the school exists, it will interfere with private workshops, and ex-students will find it hard to set up on their own account. It has been suggested that the pupils should be encouraged to seek for work in railway workshops and elsewhere. A register should be kept of the best men certified by the Inspector, and they would then already find employment in the various factories and works throughout the province. There are, however, sure to be a number of youths who will prefer to set up shops at home. The local authorities should decide when the period has arrived that the school is likely to interfere with private interests. By this time it will have performed its functions, and may be closed. Ex-students should even be encouraged to set up for themselves, and those who, in the opinion of

the Inspector, have thoroughly learnt their business, might receive advances from Government to enable them to buy tools and open a workshop. Industrial advances might be given in the same way as agricultural. The new workshops would remain under the supervision of the Inspector until the advances are repaid, and they would replace the industrial schools. A proposal of this sort has been submitted from Patna, where Messrs. D'Abreu & Co. have offered, if supported by Government, to set up a carpenter's, blacksmith's, and carriage-building firm, which shall be a school to train up workmen in improved methods. They would introduce other handicrafts as their business extended. A copy of their letter is appended (Appendix V). It is difficult to absolutely recommend such a plan. It would entail a risk of the waste of public money. But public money is now being wasted in the Bankoora and Midnapore schools, and if any scheme is to be instituted, there must always be an initial outlay. If Government is inclined to make the experiment, it would be proper to invite offers from others, so as to avoid any charge of favouritism. The grant of funds would, of course, be coupled with all the conditions necessary to make the workshop a strictly industrial school subject to inspection. Another plan is to establish such schools in connection with municipalities and District Boards. A workshop might be started in each division or district to supply the requirements of all the municipalities of the division, such as carts, conservancy appliances, office furniture, and the like. Other work might be taken, sufficient to provide a course of training for the pupils. By this means a number of skilled workmen would be provided in such divisions and districts where they are now not available, and the general standard of work would be raised. Some assistance from Government would be necessary, and might be given on the system of payments by results, and by way of prizes and scholarship, after examination. The only municipal workshops that I know of are in Calcutta where few Eurasian youths are taught their trade practically. I inquired from the Corporation if they would be willing to allow the workshops to be utilized as a training school, or would introduce a system of theoretical training for the apprentices. I append a copy of their reply (Appendix VIII), from which it will be seen that, although opinions differ as to the advantage of giving special instruction to workmen, the Corporation is not disposed to introduce it into their workshops.

Improvements in special industries, and stimulation of demand for native wares.

70. It now remains to consider the improvements which may be effected in the industries which have been enumerated in the first part of this Report. One very simple method of improvement is by stimulating the demand for native products and native labour. One firm in Calcutta pointed out to me the incongruity of Government taking up the subject of improving native industries while they continue to get all structural ironwork, and machinery direct from England. The furniture for the Viceregal Lodge at Simla, which could have been made by native labour in Calcutta, was all imported from London. Much of the brass-work required for railway fittings could be moulded by native braziers, but it is all imported. The system under which all articles required in the Public Works Department must be obtained, though the India Office operates more than any other cause to the injury of native industries. If Government, when any large bridge or other work is undertaken, either set up workshops or encouraged private firms to do so, the number of skilled artizans would be greatly increased. The East Indian Railway has set the example of establishing workshops for the supply of all its railway requirements. They have the only set of rolling machinery in India, and not only make all the rough material, but even the tools and machinery, such as lathes, etc., are locally made. There is no encouragement elsewhere in Bengal to the establishment of similar workshops. As a result, I am told that scrap iron is now exported to be re-rolled and again brought into the country. It is probable that the establishment by Government of workshops for the manufacture of iron girders and other material for important works would at first increase their cost, but there is little doubt but that it would in the end be profitable. Even the present arrangement is not satisfactory, and I have heard complaints of the manner in which stores are supplied. One Government institution had applied for a steam-lathe and received a steam-hammer, which it was obliged to retain. If it be not considered advisable for Government to set up workshops on a large scale, private firms should be encouraged to do so, and all small articles such as can be made locally should be obtained from native manufactures. It is true that native artizans are unsatisfactory men of business. As soon as any article is in demand, the price rises out of all proportion. Native workmen are dilatory in executing orders. The native shop is not inviting, and no money is laid out in attracting customers. If a workman finds his business thriving, he is not stimulated to increased exertions. His first idea is to decrease the outturn so as to raise the price, and if he can get enough to satisfy his wants by a week's labour, he will remain idle for the rest of the month. The Krishnagar clay-modellers are so afraid of competition that they are scarcely willing to sell their wares. They will not open a shop in Calcutta lest their models should be imitated by others. Under these circumstances, it is difficult to say what can be done to increase demand for native products. Most people know that ivory carvings and bidriware are to be had at Moorshedabad, but few are willing to pay large sums in advance and to wait for their goods till poverty drives the men to work. On the other hand, something might be done in this direction by keeping a list of patterns and prices of the various Bengal products, so that customers may have facilities for purchase. The Collector of Dacca informed me that he was often asked to buy Dacca filigree work for people at a distance, but in the absence of lists of designs and fixed prices, it was difficult to do so. Something of this sort is attempted in the Calcutta Museum, and the idea might be further developed. Samples or designs of what work can be supplied should be collected by the Curator of the Economic and Art section of the Museum, and an arrangement be made by which goods would be ordered from those men who agreed to abide by the prices fixed. This arrangement might be published as an advertisement, in the same way as the Bombay School of Art potteryware is advertised, and intending purchasers would then be able to buy samples of Bengal workmanship at fixed prices in Calcutta. The same arrangement might be made by the Public Works Department, who could prepare a register of all native firms who would supply such articles as they might require. By this means business-like habits would in time be fostered among native craftsmen.

Improvement in Cabinet making.

71. Turning, next, to the various industries which have not yet been considered, the first is cabinet and furniture-making. This is carried on chiefly in Calcutta and Dinapore. The trade has a great

future before it, as native gentlemen are beginning more and more to furnish their houses after European patterns. One thing required is the supply of improved tools. Workmen in Calcutta have every opportunity of becoming acquainted with them. In other places illustrated lists of tools and prices might be circulated. Indian craftsmen are ready enough to take advantage of new tools if suited to their method of work. Some English tools are too heavy for them, or as the English lathe, are beyond their strength and means. Some are not adapted to the sitting posture. Something may be done, in the manner described above, by bringing to the notice of Indian workmen improved tools and appliances, such as vices and clamps, which will enable them to work more accurately, and to produce well-proportioned and neatly-finished articles. Another *desideratum* is a supply of designs. As is well known, Indian furniture and cabinetware has no novelties. Wherever I have been, I have been struck by the want of drawings and designs from which new articles can be worked. In Calcutta and the Behar districts, European residents often keep a carpenter, who is trained to copy European designs, and excellent articles of furniture are made. These carpenters can work without a drawing to scale. They merely work from the pictures. The imitative skill of Indian craftsmen is well known. Some people aver that it is so strong that it is not necessary to teach drawing. The Superintendent of the Burrakur Iron Works was able to teach drawing to uneducated carpenters from the Arrah district so rapidly that in a few months they could not only draw out to scale, from simple sketches, patterns for ornamental iron mouldings, but could alter and improve upon the sketch. The two things most necessary for a furniture-maker are firstly, the ability to set out the work in the form of a working drawing, and secondly, improved knowledge of designs. The first may be learnt at the classes which I have suggested should be opened in Calcutta. Drawing classes should be opened in connection with the Dinapore High School for both pupils and artizans. For designs we must look elsewhere. The ground work of the art of design is drawings and a course of drawing is given with great completeness at the Calcutta School of Art. It has been suggested by Mr. Tawney that the Calcutta School of Art should be made more a school of industrial art than it now is. He suggested that it should become a school of design for industrial products such as furniture, pottery, brasscasting, and the like. In my instructions, however, I am directed not to make any suggestion, regarding the Calcutta School of Art, and even were this not so, I would prefer to recommend that the School of Design should be kept apart from the School of Art. The latter is chiefly concerned with the fine arts, and the course of training is more exacting than would be required for industrial students.

Improvement in design how to be effected.

72. What I would propose is, that a separate School of Design or special classes in which design and industrial drawing can be taught should be established. The art of designing is required in almost all trades. As a rule, the people lack in originality. Braziers, for instance, continue to reproduce uncouth figures of gods and goddesses. One man, whose work I saw, had seen in Calcutta a picture of an angel, and had added wings to a brass figure of the goddess Kali. Others had copied, in bell-metal, English cups and saucers, and, rude though they were, these novelties were in demand. The stonecarvers of Gya continue to reproduce figures from designs supplied by a Collector over forty years ago. The carpet weavers of Rungpore have the same patterns as they were taught by Mr. Nisbet in 1830. A specimen of an uncultured attempt at house decoration may be seen in the School of Art itself. If, therefore, the School of Art could be formed into an institution for producing art designs for all kinds of manufactures, it would perform a useful function. There are, however, two principal objections to the utilization of the School of Art for industrial purposes. One is that the course of drawing taught there is more complete than is required for artizans. The latter require not only sufficient training to enable them to make working drawing, but also the power of making it rapidly and without waste of time. The value of time is naturally not so much considered among students of the fine arts. The second objection is that, in a school of design, the students should be practical workers. Practical workers would understand how to design such patterns as are economically capable of construction, and would be able to utilize the design when made, or to make them for themselves after a course of training. I therefore recommend the establishment of special classes for teaching design, at first in Calcutta and afterwards elsewhere in the interior where various industries, such as furniture-making, braziery, textile fabrics, stone-carving and others, could be taken up. Lithography and wood engraving would also be taught, and, as practice for the students, working patterns and designs could be lithographed and circulated in industrial centres. There would be no harm in at first copying designs from English art magasines, at least in connection with non-oriental manufactures, such as furniture-making. By this means, novelties of all kinds would be introduced, and the necessity of relying upon European industries would be lessened. The great improvement which has taken place in English designs of late years has, as is well known, greatly stimulated the demand for articles of ornament or decoration, and the same result would be effected in India, where, as I have said before, the demand among native gentlemen is on the increase.

Extension of Art Schools.

73. The School of Design would not interfere with the Calcutta School of Art. The latter might retain the duty of teaching design in art subjects, such as ivory-carving, wood carving, and metal-chasing. The former would have charge of all drawing classes specially connected with industrial products. It would be necessary to have a central establishment in Calcutta, and the drawing classes which it is proposed to open in connection with the various workshops and industrial schools should be placed under its supervision, in the same way as English classes are subordinate to Kensington. By this means a high standard would be maintained. Itinerant teachers or inspectors could be appointed, and special schools could be started in industrial centres for working artizans. At first the principles of drawing, *viz.*, free hand and model drawing, would be taught, and by degrees the drawing of original designs could be taken up. A clever student would, after being grounded in the principles of drawing, be ready to notice objects of nature, and to take advantage of anything suited to his purpose for a design. Mechanical and geometrical drawing would also be taught to mechanics and workers in wood and iron. And the course, generally, would be suited to the requirements of the locality in which the classes are instituted. For the present I doubt if it is practicable to open art schools or classes except in connection with workshops and industrial schools

as already suggested; but, by way of experiment, I would suggest in addition the opening of drawing classes for artizans at Patna, Dinapore, and Dacca. If such schools are to be opened, pupils must at first be encouraged to attend by offers of prizes. For the present, however, I think that it would be better to trust to the central establishment in Calcutta and to the circulation of designs for improvements in native industries.

Circulation of designs.

74. The idea of circulating designs is now being carried out by the publication of the Art Journal, which is taken in by all Collectors of districts. It does not, however, reach the industrial classes. I propose to utilize the new schools of design for the issue of leaflets to all principal artizans, such as the furnituremakers of Dinapore and Calcutta, the wood-carvers of Monghyr, the stone-carvers and brass-chasers of Gya, the braziers of Ranaghat, and all the other towns in the Burdwan and Presidency Divisions where brass figures are moulded, to the carpet weavers of Rungpore, and the ivory-carvers of Moorshedabad. Designs for fancy pottery might be sent to Sewan and Culna in Burdwan. There is in Mozufferpore a potter who can make vessels of any fancy shape according to a pattern, and there must be many more in other parts of the province. The embroiderers of Santipur and the weavers of other towns would be glad of new designs. Designers are required for Messrs. Burn & Co.'s pottery works, where even in the matter of ornamental tiles the patterns have now to be copied from English illustrated catalogues. Special Indian designs, if they could be made, would be most valuable. Messrs. Ambler & Co. at Monghyr have commenced the manufacture of enamelled slateware, and though the process is, I understand, not yet complete, designers would find occupation. In time perhaps the manufacture of enamelled tiles which once existed in Monghyr might be revived. As to the medium by which the designs could be circulated, the object is educational, and the Education Department could undertake the work at little expense through the Sub-Inspectors or masters of schools. A museum is of course ordinary means by which the standard of design is maintained, but few people can visit such institutions, and workmen must be able to handle and examine the specimens before they can reproduce them. If drawings made to scale are circulated they will be able to utilize and reproduce them.

Improvements in brasswork.

75. In addition to what I have said on the subject of designs, the following suggestions are made for the improvement of the various existing industries. Of these, brasswork is the most flourishing. It has not yet suffered from foreign competition or the use of machinery. Existing processes, however, are costly, and a great saving of hand labour might be effected by machinery. In spite of the opposition of the braziers, experiments have been made in this direction. The use of dies for stamping the goods to the required shape is, I am told, being introduced by a European firm in Calcutta. Mr. Biprodas Pal Chowdharri, of Moheshgunge, Nuddea, has made the experiment with fair success. This will save the necessity for hammering out the metal. A few dies and a small hydraulic press are not expensive, and there are many wealthy firms of native braziers who, if they could get over their conservatism, could afford to purchase them. It is doubtful if it would pay to polish and file brass articles with a steam-lathe, as it works too fast, but better hand-lathes could be introduced, as has been done by Prem Chand Mistri in his cutlery works at Kunchunnagar. The use of imported brass sheets has largely superseded the old plan of making up the alloy in the shops. Punching machines would cause a saving in cutting out the required shape, or the sheets might be rolled into circular pieces in the first instance. I do not think that anything need be taught as to the making of alloys. Native braziers fully understand this business, and the localities where superior brass and bell-metal is cast are well known to the purchasers. In moulding, native workmen do not make their moulds in the ground, but make a separate mould for each casting. If they knew of the system of plate moulding, they would save much time in simple castings. The only place where I saw samples of this work were at the Kanchrapara Workshops. The general plan is to prepare a fresh mould on each occasion, and wooden patterns are not used. There are plenty of skilled carpenters who could make the models or patterns in wood, and their use would save time and maintain a regularity of work. I do not think that anything of this sort can be taught in schools, but I would suggest that practical instructions should be drawn by experienced men which could be circulated in the same way as the pamphlets of designs.

Improvements in cutlery and locksmith's works;

76. There is no room for a school of cutlery or locksmith's work. Hand-books of instructions might, however, be drawn up and circulated, where the business is carried on. At Natagurh mentioned in paragraph 16, I found the owner of the chief locksmith's shop had an old illustrated encyclopœdia which he used to help him with new designs. The book was published in 1857, and is probably obsolete, and the use of a more modern book would be a great help. Tinsmith's work is very useful, but in most towns there are shops, and it is not necessary to teach it. The only suggestion that I can make with regard to Monghyr guns (paragraph 17) is that the barrels should be tested, and that makers should be enabled to register trade marks, so as to keep up the high standard of workmanship for which they have hitherto been famous.

in leather work;

77. Leather manufacturers (paragraph 20) do not require special training. The trade of boot and shoe-making is being taught through private firms. Native shoemakers can do as fine work as Europeans, and though native shoes are roughly sewn, this is due to their cheapness, not to want of skill on the part of the makers. The use of machine stitching is extending, and good leather is imported. Leather-curing establishments might be started, but they require considerable capital. I have no recommendations to make on this head.

in basket and straw-plaiting work;

78. Special instruction can be profitably applied to mat-making and basketware (paragraph 22), so as to adapt the industry to a greater variety of requirements. In Switzerland there was a widespread system of straw plaiting schools which did a great deal for the industry. In South Germany and the Black Forest straw-plaiting is taught in special schools, and designs are supplied by the merchants. There is no reason why India should not export a large quantity of fancy and

useful basketware and braids for hats. The baskets of Monghyr have been admired at Exhibitions. At Dinapore, straw hats have been made. All the materials for every sort of straw and reed-plaiting are available in India, and the skilled workers are numerous. The subject, perhaps, is one for private enterprise, but this is one of the special home industries which, it appears to be agreed, can be assisted by the establishment of classes in primary schools. These classes can be held in the same way as sewing in English primary schools, in localities where the mat-making and straw-plaiting industry is centralized, as in South Midnapore, Pubna, and elsewhere in Eastern Bengal. It will not be necessary to teach ordinary work, but instruction may be given in all kinds of fancy braids and ornamental basketware and matting. Ornamental matting is now brought from Japan and sold in Calcutta, where it could be equally well made with the help of a little instruction.

in pottery.

79. As I have pointed out in the paragraph on pottery (paragraph 23), it does not offer much scope for improvement. So far as ornamental pottery is concerned, I have already suggested the circulation of designs, and much good would be effected if an alliance were made between the Calcutta School of Design and Messrs. Burn & Co.'s pottery works as Raneegunge. I believe that the latter firm will be glad to give pupils of the school an opportunity of learning the work of modelling practically, and both would benefit by mutual co-operation. I think it probable that a considerable demand for art ware could be encouraged among native gentlemen in the same way as the taste for modern furniture is extending. Common pottery can, of course, be improved by selection of clay, the removal of unsuitable substances, and by baking it in a kiln, so that the flames do not come into contact with the articles. The potter's wheel also should be made to run level, and the clay should be worked in a harder condition. But, as pointed out, the manufacture only consists of the commonest utensils which are not intended to be lasting. The one requisite is cheapness, and any improvement which could be suggested would increase the cost of manufacture. It would be an advantage if white china suitable for the Mahomedan population and for Europeans could be made in India; but, as I have pointed out, the proper clay is not available, and it is cheaper to import such ware.

Proposal for a weaving school.

80. The manufacture of silk fabrics is in Bengal a decaying industry. Silk materials can never be of commercial value until machinery for "throwing" the silk thread is introduced. Mr. N. G. Mukherjee has been kind enough to give me an account of the native method of making silk thread which I could not see for myself. The process is very elaborate and therefore costly, though the apparatus costs little. European machinery is too expensive for India and in addition, it is not suited to the Indian raw silk, which is of more delicate quality than China or Italian silks. It is probable, however, that if the Indian system were examined by an expert, improvements could be effected in it. As for silk weaving, the weaving of special patterns, such as the pictured *saries* of Moorshedabad, might be expended, but the art is at present confined to two families. There are plenty of silk weavers in the district who could attend a school, if one were established there. The Baluchur weavers might be induced to teach their art, and thus the silk-weaving industry of Moorshedabad would be revived. Designs would be supplied by the School of Design. Even at Lyons the weavers borrow their designs from Paris: their art is in applying them to the loom. Private liberality might be induced to give the necessary funds in order to prevent such a special industry from dying out, and the school could be applied to the improvement of all kinds of weaving. The use of vegetable dyes could also be taught, and the services of the well-known silk dyer from Bishunpur (paragraph 30) might be secured. The fact that one of the Kishnagar clay modellers has been engaged at the School of Art to teach modelling shows that this can be done. Improved hand-looms could be introduced, and a knowledge of their practical advantages extended. The hand-loom still fairly holds its own in Lyons, and with cheaper labour it would be more successful in India. By degrees a school might be started to teach pattern designing and the setting up of workable patterns, and a course of chemistry for dyers and bleachers might be opened. Sets of weavers from the other chief seats of the industry, such as Santipur, Dacca, Serampore, and Midnapore, could be deputed to learn the improved methods from time to time. The school would be conducted on commercial principles, and the weavers would be hired to work. By this means a number of weavers would be taught improved methods, which they would carry back with them to their homes when discharged. The woven materials would no doubt command a ready sale. The chief obstacle to the sale of Moorshedabad silks is their exorbitant price. At Berhampur there are many buildings available for such a school, and the only cost would be the purchase of looms and the services of the teachers and weavers. If a French weaver were obtained, he would require at the most R500 per mensem, and weavers could be entertained at from R10 to R20 per mensem. The preliminary cost of securing a teacher and providing the school with appliances would not exceed R3,000. Improved looms would be acquired as the school extended. All the raw material is to be found in the district. I would recommend the establishment of such a school if silk weaving is not to be allowed to die out of Bengal.

Improvements in cotton weaving.

81. Cotton weaving, as I have shown in paragraph 35, is still flourishing in the Serampore sub-division. This vitality is, I believe, chiefly due to the use of an improved hand-loom, mentioned in paragraph 29, which enables the weaver to work twice as fast as with the ordinary loom. I cannot understand why this loom is not used at Santipur or elsewhere. A model or drawing of the loom, as well as of the improved method of reeling the warp, might be made and circulated to all places where there are weavers. There may be some special reason for not adopting it which I am not aware of. One of the Bishunpur weavers went to the exhibition in Calcutta and saw an improved hand-loom. He recognized its advantages, but it never occurred to him to get one, nor did he even ascertain the cost of it. The Serampore loom costs R16 to R20, while the ordinary loom costs over R8. Advances might be given to weavers to enable them to procure the improved machine, and skilful weavers might be taught at the Moorshedabad school the art of weaving the more elaborate styles of figured goods. In time, possibly, the use of Jacquard looms might be introduced. I have nothing to say regarding the improvement of blanket weaving. The Superin-

tendent of Jail Manufactures informed me that the ordinary native blankets were made of better wool and were sold at a less price than they could be made in the jails by the best machinery.

Improvements in Bengal arts.

82. With regard to the arts of Bengal, it will be seen from the account which I have given of them (paragraphs 42—50) how insignificant they are. I have already made suggestions for making them more accessible to purchasers (paragraph 70), and thereby increasing the demand for them. New designs may also be furnished in the manner suggested in paragraphs 72—74. The gold and silversmiths whom I saw at Dacca were very lacking in appliances for their delicate work. The blow-pipe is not made so as to give a continuous supply of air, and is worked in a feeble oil lamp. There are no appliances, such as vices, for holding the article which is being made. The silver thread is made by passing it through holes bored in a common piece of iron which is not fixed in a stand. The only material for polishing is a piece of flint. In spite of these difficulties, the work is most delicate and effective. I do not see how any school could be established in connexion with the art. Illustrated catalogues of improved appliances might be circulated, and hand-books of instructions in all kinds of silversmith's work and in alloys, soldering, and polishing might be prepared. There is a very good book on the subject by G. E. Gee, published by Cromby, Lockwood & Co., Cheapside, London. Ivory-carving is carried on on such a small scale, and Indian work is so expensive that it is difficult to make suggestions for its improvement. It might be possible for the Calcutta School of Art to take it up and to engage the services of one of the Moorshedabad carvers to teach the art, in the same way as has been done in the case of clay modelling. The same might be done for the extension of metal inlaying, if the demand for bidriware could be stimulated.

Clay modelling and carving

83. With regard to clay modelling, an effort should be made to direct the skill of the modellers to more artistic and useful purposes. The figures now produced are only valuable as proofs of skill. One of the Kishnagar modellers is already employed in the Calcutta School of Art. If the School of Design is established, the services of another modeller should be secured to give instruction in modelling pottery and terracotta ornamental ware. Much good will be effected if the School of Design will work in co-operation with Messrs. Burn & Co., at Raneegunge, or will assist in the establishment of other pottery works. In the same way stone-carving may be extended, and skilled workmen may be hired from Gya and Cuttack as teachers. There should be a large demand for ornamental stone-work in connexion with Government buildings and native temples if a sufficient number of carvers could be trained. Wood-carving should also be taught, and possibly schools could be started in Dinapore, Monghyr, and at Darjeeling.

Introduction of new industries.

84. Many persons from whom I made inquiries suggested that Government should introduce new industries on a large scale. The manufacture of glass from the materials available in Chota Nagpore has been recommended. Others suggested that schools should be started to teach soap-making, leather-curing, match-making, the extraction of perfumes, electroplating and enamelling. If such industries are to be taken up by Government, it could only be done by way of demonstration and not for a profit. It might be possible to start them, and, when established, to make them over to private companies, as has been done in the case of the Burrakur Iron Works. In my opinion, however, it would be wiser to leave the introduction of new industries to private enterprise.

Provision of training staff.

85. I have now completed the suggestions which I find it possible to make for the improvement of native industries in Bengal. My inquiries have led me to the conclusion that it is not possible to introduce any wide system of technical instruction, and the proposals which I have made do not profess to provide for a complete scheme. I have recommended the introduction of such measures only as appear to me practicable and suited to be present industrial requirements of Bengal. The exclusion of the Seebpore College and the Calcutta School of Art from the scope of my inquiries has made my task more difficult than it otherwise would have been. These institutions should be the stem upon which the various branches of special instruction should be grafted, but if this cannot be done, they can at least be made of use for the supply of teachers. I have been directed to report the kind of tuition or the standard of attainments on the part of the instructing staff that would be essential to the introduction of improvements. The supply of trained teachers is a difficulty, but considering how simple is the course of training which I have proposed, the difficulty is much lessened. For the mining school proposed in paragraph 63 the same class of teachers as are employed for the subordinate classes at Seebpore will suffice, and a lecturer on mining, machinery, and mine surveying should be imported from among the students of the Bristol Mining School, the Urgan School, or the London School of Mines. For the drawing classes for mechanical engineering apprentices, and for actual mechanics and artizans, proposed in paragraphs 65-66, teachers can be supplied from the Calcutta School of Art or could be trained in the proposed School of Design. Until such teachers are available, the classes may be taught by the draughtsmen engaged in the various workshops, under the supervision of the Calcutta School of Art or the new School of Design. The course should not be too elaborate, but should include free-hand; mechanical and geometrical drawing. Where the study of design in an object, as in classes for furniture makers, model drawing must be added. For the mathematical classes and to teach elementary science and physics, lecturers can be obtained from graduates of the Calcutta University, who have passed through the B course. The mathematical course would include arithmetic, algebra up to simple equations and proportion, trigonometry. the first three books of Euclid, and the elementary text books of mechanics, dynamics and hydraulics. These lectures would be given only twice or three times a week for the four cold weather months of the year, and it would be possible for one lecturer to attend two classes, if the distance is not too great, as in the case of classes at Jamalpore and Somastipore or in Calcutta and Howrah. The lectures must be thoroughly practical, and it would probably be necessary to make the lecturers subordinate to the Superintendents of the workshops, where they take an interest in this form of special instruction. There is a series of primers issued in the Glasgow technical schools, which would be of great value to the lecturers. I have unfortunately not been able to obtain them. It is more difficult to point

out how a knowledge of machinery is to be taught. Sectional drawings and working models can be obtained in England, and it should be possible to obtain the services of practical engineers to lecture upon this subject and to explain the principles of machinery. If the lecturer whom I have proposed for the mining school is engaged, he could train lecturers on this subject, and a supply of trained teachers would soon be available. For the industrial schools, passed students of the subordinate class at Seebpore would be efficient Superintendents. They would be able to give the training in mathematics and drawing, while skilled artizans could be retained to supervise the manual work. In the case of industrial classes attached to Government schools, it would be sufficient to employ artizans as teachers. The chief object of these classes is manual practice. For the school of Design (paragraph 72) a trained art student is necessary, and it would be a great advantage if he had some Indian experience. For the weaving school proposed in paragraph 80, the chief difficulty will be in obtaining the services of a Superintendent. If a European is imported, he will be of little use until he has mastered the language. I would suggest that at first some practical man from Bengal or other province of India be obtained who could understand the working of improved looms. The first object should be the introduction of improved hand-looms. If the school is successful, a student from the Ecole de Commerce, Lyons, might be engaged, or a Bengali student might be sent to Europe, and by this means the use of improved appliances and the weaving of more elaborate patterns could be introduced. By degrees also a chemical course for dyers and bleachers would be added to the school, but progress in this direction must be gradual, and it is not immediately necessary to provide teachers. For the improvements which I have suggested in other industries, reliance must be placed upon practical men, as no instruction in theory appear to be required.

Conclusion.

86. To sum up the chief proposals which I have made are the following :—

(1) The institution of a school for mining students in connection with the coal mining industry of the Raneegunge and Giridih districts (paragraph 63).

(2) The training of mechanical engineers by the introduction of apprentices into the workshops connected with State Railways (paragraph 65).

(3) The provision of special training for apprentices and intelligent workmen in the Railways and Canal Workshops, and in Calcutta and the Suburbs (paragraphs 65-66).

(4) The institution of improved industrial schools, and the encouragement of industrial classes (paragraph 67).

(5) The appointment of an Inspector to supervise industrial education (paragraph 67).

(6) Private firms and municipalities and Local Boards should be encouraged to open technical schools (paragraph 69).

(7) The stimulation of native industries by the preparation or purchase of materials for public works in India and not in England, and by the collection of samples and the register of firms of native manufactures (paragraph 70).

(8) The establishment of a school of drawing and design for industrial purposes, and the circulation of designs among native workmen (paragraphs 71-74).

(9) The circulation of practical instructions among leading braziers regarding moulding and working with dies (paragraph 75).

(10) The introduction of schools for mat and basket work in localities where the business is carried on (paragraph 78).

(11) The improvement of ornamental pottery (paragraphs 79 and 83).

(12) The establishment of a weaving school at Berhampur in connection with silk and cotton weaving (paragraphs 80-81).

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## APPENDIX I.

### LIST OF MINOR INDUSTRIES NOT PREVIOUSLY DESCRIBED.

*Acids.*—Dr. Waldie's Chemical Works at Cossipore are well known. There is another manufactory in Bhowanipur, which belongs to a native.

*Boats.*—Boat-building is carried on in all river-board districts, especially in Northern and Eastern Bengal. At Bally, near Calcutta, a large number of small boats are made every year. Sailing vessels for the coast trade are also made at Chittagong.

*Bone manufactures.*—Large quantities of buttons are made in Calcutta. Combs and small boxes are also made.

*Book-binding*—Is done in many towns, and especially in Calcutta, by duftries. In Calcutta some educated men have lately opened establishments, where the business is carried on on more extensive scale.

*Brush-making.*—This is a new trade lately established at Calcutta. At Kassimtollah about 100 men are employed, and at Khurdah, in the 24-Pergunnahs, there is an extensive manufacture of brushes and combs. The demand for brushes among natives is increasing.

*Candles.*—The manufacture of candles, for which Patna was famous, has almost died out owing to the introduction of kerosine oil.

*Electro-plating.*—There are ten or twelve electro-platers at Calcutta, who have learnt the business in English shops.

*Engraving.*—Wood-engraving is taught in the School of Art, and some of the *ex*-students have now opened shops at Calcutta, but the demand for their work is small, and they are not in a flourishing condition. There are also many wood-engravers who have been taught privately.

*Fishing apparatus.*—Hooks are made at Dhaniakhali in the Hooghly district, and lines somewhere near Seakhala in the same district.

*Gilding.*—This is chiefly connected with the manufacture of imitation jewellery. The bracelets, etc., are made of copper or brass at Bompass in Burdwan; and at Sidhi near Calcutta, and they are gilded in Calcutta shops in the Chitpur Road. There is a large business done in these articles, which are also imported from Austria and Germany.

*Horn-manufactures.*—Horn combs are made in some quantities at Khurdah, 24-Pergunnahs, and in Patna. Hornwork is also made up in Cuttack, and at Monghyr and Panihati, 24-Pergunnahs. It is applied to cutlery in Lohardagga. Large quantities of sambhur horns are annually exported from Orissa and of deer horns from the Nepal jungles through Dhurbhungah.

*Inks.*—Both writing and printing inks are made in Calcutta. They are, however, not of good quality, and considerable improvement can be made in them. The best ink is made at the Peacock Chemical Works, opposite the Sanskrit College, Calcutta.

*Lac works.*—Lac bangles are made all over the country. There are some fifty families in Patna. Lac toys and lacquered ware are made at Ilambazar in the Beerbhoom district. The work is inferior, and there is very little demand for the articles made.

*Lace*—Called *gota*, is made at Dacca, Moorshedabad, and Patna. It is more made of gold and silver thread, and is more properly a border. The manufacture of European lace might be taught to native ladies as has been done in the Nazareth Convent in Madras.

*Lithographs.*—Some of the *ex*-students of the Calcutta School of Art have opened shops, where they lithograph Hindu mythological pictures.

*Masonry work.*—There are masons and bricklayers everywhere. They might be taught accuracy and finish, but this can only be done by practical training under careful supervision.

*Musical instruments.*—Native musical instruments are made at Calcutta, Dacca, Moorshedabad, and Patna. They are made by ignorant men, who have no scientific knowledge. A few natives of Calcutta have taken to the trade of repairing and tuning pianos and other English musical instruments.

*Paper.*—Country paper used to be largely made in Hooghly district, but the trade was ruined by the jail taking it up. The jail manufacture, in its turn, had to give way to the Bally and Serampore mills. Paper is still made at Sahar and Nasrigunge in the Shahabad district, and there are two factories at Arwal in Jehanabad, Gya. The materials are either jute fibre or waste paper. Paper in small quantities is made in Dacca, Furreedpur, Rungpur, and at Mohwa in Mozufferpur. There are twenty-five families of paper makers in Behar, Patna district. In Shahzadpur and Majira, in Bogra, a small quantity of paper is made.

*Perfumery*—Is made to a small extent in Patna, but the chief supply comes from the North-Western Provinces. The perfumes are distilled from roses, jasmine, the chameli (*jasminum grandiflorum*), the keara (*pandanus*), and the root of the andropogon. Sandalwood and linseed-oil is made and impregnated with scent.

*Soap.*—Country washing soap is made at Nurundea, Dacca, of shell lime 10 maunds, sajimatti 16 maunds, common salt 15 maunds, linseed-oil 12 maunds, and grease 15 seers. It is also made at Patna, but the proportions of grease and oil are reversed, and fuller's earth is not used. Sasseram is also famous for soap. The number of families engaged at Patna in soap-making is thirty or thirty-five.

*Stone manufactures, such as cups, platters, etc.*—The largest industry is in Gya district, where there are some 200 persons engaged in stone-cutting at Pathalkutti village. The stone is a sort of granite, which is coloured black with a mixture of oil. It is polished with sand on a lathe, and afterwards with a stone made of a mixture of crushed corundum stone and shellac. There are 15 families of stone-carvers in Maroofgunj in Patna. There are others in Lohardugga, Balasore and at Karaj in Cuttack. There were a number of stone-carvers at Monghyr, but they have been taken up to do rough-shaping in Messrs. Ambler's stone quarries.

*Tape-making*—Is carried on by some thirty or forty families in Patna, and on a smaller scale elsewhere. Mudhobunni, in Durbhunga, is a seat of the industry.

*Tile-making and brick-making*—Do not call for any remarks.

*Tin foil.*—Tinsel is largely made in Calcutta. It includes the making of imitation jewelry, gold lace, etc. Large quantities are imported from Germany.

*Toys.*—There is large demand for this article. The indigenous manufactures are, however, rude. Kalighat is the principal mart for toys made of clay near Calcutta. Toys of lacquered ware are made at Ilambazar in the Beerbhoom district, and at Sasseram. Patna is noted for its wooden toys. Paper toys are made at Dowakhola in Mymensingh.

*Watch and clock-making.*—The making of clocks is impracticable in the face of the large import from abroad, but there are men who can repair clocks and watches to be found in most towns. They have learnt the business in English shops in Calcutta.

E. W. COLLIN,
*On Special Duty.*

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## APPENDIX II.

### Extracts from Diary.

Brass work in Calcutta.

1. *August 27th.*—I visited the brassware manufactories in Kansapara, Calcutta. The work is chiefly in copper beaten out. The pieces are welded together with heat, and finally soldered with a mixture of borax and zinc in a molten state.

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The workmen also make castings from moulds. I saw a tiger's head and the capitals of some pillars. The mould is made without any education in drawing or modelling. In Kansapara brass hinges are moulded.

Cabinet-making, Messrs. Lazarus & Co.

2. I visited the workshops of Messrs. Lazarus & Co. The head of the firm informed me that there were about 7,000 cabinet-makers in Calcutta, and he employs about 800. The men learn by beginning as boys. They first polish the wood with sand paper, then do a little chipping and so get on to the higher branches of the business. The old hands bring the boys into the shops and are responsible for their work.

A few workmen can work from drawings and paper sketches, but Messrs. Lazarus & Co. do not encourage this, as the men steal his designs and make the articles for the bazar. The headmen are not educated men, but get R8 and R2 diet money. Clever workmen learn carving in the shop, and can after a time draw out patterns and designs. There is no demand for a trained carver.

No special knowledge is required of the classes of woods. The chief thing wanted for native workmen is the use of appliances and aids to accuracy in work, *i.e.*, accuracy of fittings, joints, and angles. As to polishing and painting, it is a question of expense and the use of proper materials.

Electro-plating and gilding.

3. I visited the Mechua Bazar, where there are shops for electro-plating and gilding. This has all been learnt in Calcutta shops.

Leather work.

I visited Messrs. Monteath & Co. The head of the firm said we had nothing to teach the men in manual skill. All men are educated as apprentices.

Alipore Jail and Reformatory.

4. *August 28th.*—I visited the Alipore Jail and Reformatory. It appears that carpentry and blacksmith's work are taught only by experience and manual practice, the men beginning at the lowest branches even in regard to machinery. There is an uneducated man in charge of the engines on R30 per month. There is also an uneducated man in charge of the iron and carpenter's shop at the Reformatory on R25 per month.

No technical training is given in the Reformatory. The Superintendent suggested that figured drawings and designs of furniture, etc., and patterns and price-lists of tools be circulated. Native workmen should know what is going on in the trade, and where to get tools, and he thought that the introduction of demonstration shops would be beneficial.

5. *August 29th, Santipur.*—I visited Santipur, in the Nuddea district, where there is weaving and brass work. There are about 3,500 families engaged in weaving out of a population of 30,000. The industry is declining. It consists in weaving *saries*, etc., from imported thread. The thread is locally dyed. Blue and orange colour are locally made, but other dyes are imported.

The speciality is in weaving coloured borders to white cloths.

A man can weave four pairs a month. A pair is ten yards. This sells at R4 to R6 per pair. The cost of the thread is about R2. The weaver's profits average about R10 per month, and he is satisfied if he can get this. Formerly he could get R20 per month, but he would never work so hard as this. He used to work half as hard and gain the same amount.

They get ideas for the borders from books and designs which they see in Calcutta. The women folk embroider the cloths, when made, with patterns in coloured silks or worsteds, which they buy in Calcutta. The designs are conventional and ineffective.

6. *August 30th.*—I visited the workshops instituted by Mr. Biprodas Pal Chowdharri for brass and ironwork at Moheshgunge, Nuddea. The information there collected is given in a separate note.

7. *September 1st—3rd, Dacca.*—The best known industry of Dacca is weaving cloth with edges of gold thread (jaladar work). When flowered it is called jaladar jamdani. The latter also made at Demra in the district. The thread is imported from England. It is wetted, dried, reeled, and then starched with a mess of fried rice into which colour is added. This prevents the thread from becoming thick in bleaching.

The gold thread comes from Benares. A piece of five yards fetches R20, of which R7 or R8 is the cost of the thread. It takes fifteen days to make a piece.

The jaladar jamdani work is more expensive. A piece of five and-a-half yards costs R100. The cost price is R60. A weaver makes about Rs. 10 per month.

The cloth, when made, is bleached by being washed with fuller's earth from Patna (*sajimati*) and country soap. The latter is made in Dacca, at Nurandea, of lime and fat.

Ordinary cloth without an edging is made in Dacca, and about 300 families are engaged. There are 40 families engaged in weaving in Bazidpore, Mymensing. About 100 persons work on the jaladar work.

Saffron used to be prepared for export in Dacca, but the trade is dying out owing to aniline dyes.

8. The following are also specialities of Dacca:—

Kasida turbans, embroidered silk.
Chikan ditto ditto.
Azizi cloth made of silk and cotton mixed.

The kasida and chikan work used to be exported to the extent of four lakhs, but now only one to one and-a-half lakhs are exported owing to the introduction of machine-made cloths.

The cloth is woven in the district of raw (Muga) Assamese silk. There are about 3,000 weavers.

Azizi cloths are woven by ordinary weavers, and about 2,000 pieces are made yearly, but Jews who formerly took this cloth, are now beginning to wear European cloths, and the industry is declining. The cloth is made of bleached cotton and raw silk.

The embroidery is done by women, but men also work at chikan work.

The kasida men get about R2 per month; those employed in chikan work get nine pies per day, and women six pies.

The design is stamped on and then embroidered. No particular attention is paid to the stamping, nor to the introduction of new designs. The value is in the sewing, and native workmen cannot do this equally throughout, whereas it is done with uniform excellence by machinery.

Only two or three families work in Dacca muslins proper. It is made of the country thread.

Dacca muslins.

About 500 families work at the inferior muslins of English thread of various thicknesses, and this has a considerable sale.

Shell work.

Employs about 400 persons. The shells come from Madras and the coast.

9. *September 3rd.*—I visited the Railway Workshops at Dacca. There are 500 men employed.

Railway workshops.

One man had a partial education at Seebpore. He gets R45 per month, and can draw and work from drawings. Other workmen are got from Saidpore and Jamalpur. Boys are taught their work practically. There is a school for the firemen held in the evening for elementary education. Workmen's wages vary from R7 to R40. The Superintendent is in favour of a technical school which would teach drawing. This would save supervision.

10. I visited the gold and silversmiths whose speciality is filigree work. They have books of patterns of Bengali work. They also use jeweller's catalogues. The results of the use of the latter are not at all satisfactory. Their work is well known, and has been shown at various exhibitions. They profess to know all about mixing, polishing, and soldering metals. They use a flint for polishing. The trade is flourishing, and the men have a practical monopoly of the business.

11. *September 5th.*—I visited Messrs. Jessop & Co's. firm. The head of the firm says

Messrs. Jessop & Co.

that any education must begin from the lowest steps, as all the great men have risen. He does not approve of Babus, Europeans or Eurasians as workmen. Other workmen have great imitative power, but unless carefully watched will, after doing a thing right for several times, do it wrong, and then hide the fault. Sons of artizans now become Babus, and no longer follow their father's trade.

He would give the artizan class an improved education in reading and printing, and especially in arithmetic, geometry, mensuration and drawing—free-hand and mechanical. At present the men start in the shop at the lowest grade and gradually rise. If educated men were found, they would be more useful as foremen in the shops and head of gangs, and they would also be able to shift for themselves when sent away on jobs.

Men are sent up-country now, but they require high wages, and their health suffer.

Messrs. Jessop & Co have tried teaching apprentices. They instituted a course in mathematics, but the boys used to steal the books, and the attempt failed.

Draftsmen are required. At present no artizan can draw, or *vice versâ.* Even draftsmen are not satisfactory. Messrs. Jessop & Co. would give evening classes, if the men could be induced to attend; but this is doubtful.

12. Mr. Lee from the firm called on the 7th September to consult me regarding the training

Messrs. Hoare, Miller & Co.

of engineers for small steam-vessels. He says that under the present Act natives are allowed to be in charge of vessels of 80 horse-power engines, but they must have served a year on steamer; so they begin as coolies, firemen, oilmen, and then pass a very slight examination in practical work, and become engine-drivers on R35 to R50 per month. They have no knowledge of machinery, and no education whatever, and cause great expense, as they cannot tell what is wrong with the engines, and cannot repair the machinery. The men might be taken from workshops; but there they earn money, and they would have to descend to work as firemen for their year's apprenticeship on the steamer. Low grade engineers from other bigger ships might be employed, but they are almost entirely Europeans and Eurasians, and get salaries of R70 and R150. He would be glad to get educated men of some standing if it could be managed. It would pay, as there would be fewer accidents. The men are chiefly Mahomedans, their cooking arrangements taking of less room.

13. *September 9th, Midnapore.*—I visited the Maisadal Technical School. The trades taught

Maisadal School.

are carpentry, cabinet-making, and tin and lock-smith's work. The school has a contract for supplying rough treasure boxes, which gives a large employment in elementary work. Native mistries are brought in to help in this work. There are 52 boys—35 at carpentering and 17 tinsmiths. The boys are chiefly of low caste and only two Brahmins, and it is doubtful if they will take up trade. It is said that the school has been started only three years, and that the object is to supply the want of carpenters in the district. For this reason three wards' estates give scholarships on the understanding that the boys should take up work on the estates. At present only three boys have left and taken up work as carpenters in the bazars, where they earn R20 per month. The other boys have not worked long enough or with sufficient regularity to learn their business. No one has yet left the school who has had more than one and-a-half years' training, and this is not enough.

The boys are taught the usual course in the school and work in the shop in the afternoon. They are paid three-fourths of the value of the article sold, less the cost of material. This payment

has had a good effect. The average attendance out of 35 in the carpentry class has been about 20 per day.

*Faults* of the school:—

(1) They have no proper teacher.—There is a mistri on R25, who is a bad workman. It is proposed to get a man from Seebpore on R50.
(2) Want of regularity of attendance.—The boys do not learn business habits and are under insufficient discipline.
(3) Want of accuracy in the work.—The joints, etc., are inaccurately finished, and the mistri in charge does not insist on proper work and finish. Much of the best work is done by himself.
(4) Continuance of native habits.—Such as hitting the hammer with the hand instead of mallet, absence of vices and clamps, etc.
(5) Improper appliances.—The bench and table at which work is done is ricketty and unsteady. They have a supply of English tools, but do not seem to use them.
(6) Want of object.—The boys propose to set up as workmen on their own account, but evidently the incitement to this is small. It would be a good thing if they could be taken in at some shop like Lazarus and Company, or could go on to Seebpore.

Midnapore Workshops.

There are canal workshops at Midnapore, but Mr. Scotland, the Engineer, says he can never get any workmen from the school. I visited the shops. The men there are chiefly foreigners from Buxar, Calcutta, or Balasore, where there is a workshop. Mr. Scotland says that he would not object to having a training school in the shops, where the boys would learn for three hours a day, and they could also have an hour's drawing lesson from his draftsman.

The Maisadal school teaches drawing, but at present has no master.

Mr. Scotland gives his opinion that native workmen have the imitative faculty so strongly that it is not so necessary for them to learn drawing as in Europe.

The workshops at Midnapore would make a good training school, except that the work is of the carpentry and joinery class chiefly and not cabinet-making; but, on the other hand, the work is more thorough. Work is done by piece-work in the workshops and so would not be available for boys. The tinsmith's school does not appear to be required, as there are tinsmith's shops in the town.

Locksmith's work—Natagurh, 24-Pergunnahs.

14. *September 11th.*—I visited Natagurh, 24 Pergunnahs, where there is a colony of locksmiths. There are 50 families at work, and one factory under Baboo Dwarkanath Karmokar; he has ten men under him. They make English padlocks and keys for sale in Calcutta. The brass pieces are cast in the Sukhpure village, where are five brass-casters. They are finished up in this shop and fitted with keys. The work is very neat, and the locks complex. The Babu has English books, *viz.*, Tomlinson's Cyclopædia of Arts and Workshops Receipts by Ernest Spon. The books are old editions, 1854, but probably useful.

Babu Protapa Chandra Ghosha.

15. I had an interview with Babu Protapa Chandra Ghosha, who in 1875 wrote a pamphlet on Art Education for the masses. He does not think that anything can be done to teach carpentry, etc. This is work with which Europe cannot compete, and native workmen must always be in demand, and therefore will learn their work. Cotton weaving is also in a hopeless position and paper making has been taken up by big European firms. Glass-making is impossible in this country without a very expensive blast furnace. Glass blowing is done to some extent. The tinsmith's business is sufficiently well established. Dyeing and cotton printing have been taken up by a firm in Russapugla, Bhowanipur, called the Bengal Science and Art Union Company. There are about 20 skilful cutlers in Bhowanipur who make surgical instruments, and a firm, called Nondan Brothers, also cutlers. Cotton dying is being given up as natives of Bengal do not like bright colours as in the North-Western Provinces. Tinselware and mock jewelry is now imported from Germany, but might be made in this country. There are plenty of engravers and lithographers, and no teaching in this branch is required. He would establish demonstration school for soap-making, extraction of perfumes and essences, stone-carving, enamelling, electroplating and electro-typing. At present there are only eight or nine stonecarvers in Bengal. Enamelling is dying out altogether. Soap-making (lime and cocoanut oil) is carried on, but might be improved.

The schools would be demonstration schools like experimental farms, and would not work for a profit.

Messrs. Burn & Co.

16. I visited Messrs. Burn & Co. The manager did not think that there was much room for the education of mechanics. Apprentices are taken in, but these are educated Europeans or Eurasians. He has never had a Babu apprentice, and only one Seebpore passed apprentice, who is not a good man. All the workman begin as boys, and are taken on as they learn the work. Their fathers are responsible for them. Work is almost entirely done by piece-work. Each mechanic and each foreman (there are 12 European foremen) has a different branch of the business, and he knows only that. The manager feared education; he mentioned two instances of native foremen having sons educated, and they became Babus and clerks. The Manager's son is now completing a four-year course of manual work in England prior to becoming an engineer. The foremen out in India must always be Europeans specialized in one branch of the business. No education is necessary for the native workmen. I consulted him about his potteries as an Art school, but he says the work there is all practical work—making firebricks, tiles, etc., and there is no room for art designs.

Messrs. T. E. Thomson.

17. I consulted the Manager of this firm. He is inclined to think that the boys should have some education in drawing, and perhaps mathematics. The best boys would then carry on their own education, while they sufficiently learn their business practically in the shops.

18. *September 12th, Bankoora.*—I visited the technical school at Bankoora. It has been started about five years. It gets R25 per month from Government, R13 (about) from private subscription, and last year it earned R5 and R60 from sale of work. It has a superintendent on R10 per month and three mistris on R8, R3. It also pays R5 weekly to the boys as rewards for work proportionately to the work done by them. There are now 49 boys with an average attendance of 32. They work from 6 A.M. to 9 A.M. daily except Thursdays. They are of all ages, from 7 to 16. They remain in the school two to four years. The trades taught are carpentry, tinsmith's work and wicker work. The latter is taken up by domes and sweepers. Carpentry is done by boys of the carpenter class and also by fishermen, dhobis, and telis. It is said that as soon as they have learnt their work partly, they go away and get employment. Tinsmith's work is popular, as it requires no capital to set up a shop, and six boys have done so. There is a miscellaneous class in which lithography and drawing is taught, but this is very slightly. There is also ink-making and colour-making. Brahmin boys join this class. The work turned out is very rough, and no attempt is made to improve upon the most primitive style of carpentry. The boys have a few good tools, but are without any appliances, such as branches, vices, or any aids to accuracy. Bankoora, however, is much behind the world, and the school apparently does some good work. The boys are said to get employment readily when they have been taught in the school.

Technical School.

19. There are about 100 families who weave a cloth of mixed tussar and cotton. This business has declined owing to a rise in the prices of tussar cocoons. They are brought from Chota-Nagpur, but recently they have been largely exported to Calcutta, and the price has risen.

Industries : Weaving, Metal wares.

This cloth, when made, sells at R1-2 to R1-4 per piece of five yards by one yard. Two persons will make 16 pieces a month; value about R18, of which the price of the thread (imported twist) will be R11.

There are a few weavers of tussar cloth. This sells at R9 per pair of ten yards, of which R7 is the price of the tussar. A man aided by three women of his family can make four pairs a month, and thus earn about R8 per mensem.

The cloth is very rough. Sometimes the tussar is dyed with dyes imported and brought in the bazaar. Three families make large table-cloths 15 feet × 6 feet, at R10, of which the warp is tussar silk and the cross thread different coloured cotton in stripes.

The looms used in Bankoora are not so rough as those which I saw at Santipur, and have pulleys and other appliances.

A few weavers make cotton check cloths, and about 100 families weave simple cotton cloths. The weavers can sell all they make, but since free import of cotton goods their profits have fallen

There is nothing particular to say about the brass wares. Bell-metal, cups, etc., are largely made. A *lota* with a spout is the speciality of the town.

There are a few makers of shell bracelets in the town.

20. *September 13th, Bishunpur.*—I visited Bishunpur, a subdivisional head-quarters 20 miles from Bankoora. The silk weaving is famous chiefly through a merit of one Koylash Chandra Rajak, who obtained a silver medal at the Calcutta Exhibition. The chief industry of the place is weaving tussar cloths. About 2,000 persons are engaged in this business. What has been said regarding tussar weaving in Bankoora applies to Bishunpur.

Silk weaving.

In silk weaving about 25 families are engaged. That of Koylash Chander Rajak is the principal, but he has only three looms. He works chiefly to order, and in some cases advances are made. The business is on a small scale, and the profits of the industry are declining, as the silk thread is becoming more difficult to get. It is bought in villages in the Bankoora district, where it is reeled ; but the weavers make the threads of the various qualities or thicknesses required. This is done in the most primitive method, and therefore the silkthreads are uneven and the quality of the cloth varies. The thread is dyed from dyes prepared by the weavers. In this the industry differs from that of tussar weaving, where foreign dyes are used. The preparation of the dyes for silk weaving is a speciality, and is kept secret. A *than* of silk is 12 yards, and it sells at R1-8 to R2 per yard. The thread costs R10 to R13 per *than*. A family can make two or three *thans* per month, and the profits are said to be R8 or R10 for each weaver, including the assistance he derives from his womenfolk.

Koylash Chunder Rajak went to the Calcutta Exhibition and saw an improved hand-loom there. He thinks that it would save labour, but it did not occur to him to ask the price. His own looms cost about R6, and are the same as have been in use for over three generations.

The makers of tussar cloth have a way of bleaching the silk which is very effective. They fill a basket with the ashes of sal wood, and pour water over it. The water after passing through the ashes has the property of bleaching silk.

Silk weaving should never altogether die out, as it is the custom for natives when at worship to wear silk clothes, if they can afford it.

21. *September 14th, Raneegunge.*—I visited Messrs. Burn & Cos'. Pottery Works, and was received with great courtesy by Mr. White, the Manager. So far as the works are engaged in making pipes, bricks, tiles, etc., there appears to be nothing to teach the workmen. Nor do the mechanics who work the engines require any special training. If an analysis of clays is required, it can be made by English specialists in that branch. No chemical knowledge is therefore at present required.

Messrs. Burn & Co., Pottery Works.

The firm, however, has a large business in modelling ornamental jars and vases, architectural decorations, friezes and the like. For the preparation of the designs a knowledge of drawing and modelling is necessary. The drawing must be free-hand and mechanical, as terra-cotta ware must be made according to scale, and the size of the articles varies, before and after burning. The

Manager has started a small class, where boys are taught drawing, designing, modelling, etc. He has a few European boys and six or seven natives. The latter class is most interesting. The boys are simple coolies, who would ordinarily pull punkahs, but they have two hours' drawing lessons a day, and after a time become expert at it. They at first simply copy, and then reduce or expand models, and so get on to mechanical and geometric drawing. The method of instruction is not very scientific, but it is effective. After a time the boys are set to modelling according to copies or according to scale, and in course of time are taken on as workmen on R15 to R20 per month. Mr. White has already trained several men, but he wants more. Terra-cotta ware for architectural purposes is now much in demand, as it is found to be more lasting than stone. I asked him if he ever tried the Calcutta School of Art students. He had had two modellers, but he found that they had no idea of working to time and thus their services were not worth the high pay required. Mr. White would be willing to take on students who had gone through a course of training in the Art School in drawing and modelling, as probationers for a time, and then as employés, if they would come on R20 to R25 per month. Men who had had the training would save money to the firm as requiring less supervision. Figures and designs would be made correct in shape and size without constant watching. The drawing or inventing of designs is a *desideratum*, and boys once trained to the work in a School of Art would be able to constantly invent new designs from the common objects of nature.

Coal Mining—Bengal Coal Company.

22. I visited Mr. Wells, the Manager of the Bengal Coal Company. He informed me that there was a great field for education in the mining industry. At present the industry is in its infancy, and the surface of the coal measures only is being worked. The working, moreover, is highly unscientific, and there is a waste of from 30 to 50 per cent. against 3 per cent. in English coal mines. The first *desideratum* is supply of trained assistants. At present these are chiefly brought out from England, but they are unacquainted with the language, and the course of training for mining in England is not necessarily adapted to mining in India. Other assistants are engaged in India, but they get no theoretical training. What is chiefly required is a knowledge of geology, surveying, mechanics and machinery, drawing and hydraulics. It appears that there are about 100 assistants now employed, and as coal mining extends, the number of assistants will increase. From ten to fifteen vacancies occur every year, and thus, allowing for a three-year course, a school of 40 to 50 boys could be started at once.

As for the training of artizans and mechanics, Mr. Wells informs me that there is great scope for it. Men are required in large numbers for working the engines and for employment in the workshops of the various coal mines. At present these sort of men are difficult to procure. The objection to migrate is a great difficulty. Mr. Wells thinks that there might be some training for these men, which would raise the value of their services, but it is not clear how it can be effected.

23. *September 16th, Burdwan.*—From enquiries at Burdwan it appears that the chief industries of the district are brass and bell-metal ware, cutlery, cotton and silk weaving, and pottery.

Pottery.

Kulna is famous for its pottery, which is very durable. In fact, durable pottery is produced everywhere on the banks of the Bhagiruthi.

Brassware.

24. The total produce of the brass and bell-metal ware is estimated to be 15,540 maunds valued at R4,30,839. Bell metal wares are chiefly made at Purbusthali, where 200 families produce about R30,000 worth yearly. The chief places for brassware are Dainhat, where 300 families work, and Bompass, in the Sahibgunge thanah, where there are 200 workers. In the latter place R43,000 worth of brass ware is made annually. A considerable amount of mock jewellery is also made and sent to Calcutta to be guilded.

Weaving cotton and silk.

25. *Cotton Weaving in Burdwan.*—The outturn is estimated to be annually 900,000 yards valued at R1,10,000. The chief centre of the industry is Kulna, with 500 weavers. The weavers are said to be in prosperous circumstances, and there appears to be some revival of the industry.

Silk weaving is carried on chiefly at Maimari and Radhakantpur, where *gorud* cloths are made and where some 200 families are engaged in the industry, and produce annually about 26,000 yards, valued at R35,000. There are tussar weavers, who produce about 30,000 yards, valued at R1,27,000 annually. At Mankar, 460 familes weave tussar silk, and produce over a lakh of rupees worth of cloth. This business is increasing, as European firms are buying for export.

The business of silk and tussar weaving is subject to great variation, according to the supply of cocoons.

Cutlery.

26. *Kanchannagar, Burdwan.*—Cutlery is made at Kanchannagar near Burdwan. I visited the place. The chief firm is that of Prem Chand Mistri, who supplies the Stationery Departments of Bengal and Bombay with knives, scissors, etc. He has a small workshop, and employs about 15 men. He is self-taught, and has gradually learnt the preparation of cutlery as good as Birmingham wares. He sells a knife at 9 annas while the Birmingham knife is 13 annas. They are made of cast-steel and all the fittings, handles, etc., are made in the shop. Prem Chand Mistri has made some lathes for polishing, filing, etc. These are simply discs of metal with various edges, which are revolved by hand-power.

Two other shops have been started in the town by men who have worked under him. I asked him if he intended to make a B. A. of his son, or to keep him to the trade, and he said he would not give him to much education, but he might send him to a European firm, where he could learn the use of improved tools, etc. I visited Lala Bun Behari Kapur, where we discussed the possibilities of technical education applied to ordinary industries. He said that what was required was to raise the standard, and this could only be done by schools. He suggested schools at centres like Burdwan which should supply all requisites for the municipal town in the Division.

27. *September 17th, Serampore.*—The chief industries of the Serampore town are silk and cotton weaving. There are about 70 looms for weaving silk and 100 for weaving cotton in the town, but the total number of persons supposed to be engaged in weaving in the subdivision is 6,000, and the outturn 635,000 yards, at a value of 9¼ lakhs. These are the figures for 1886.

Silk and cotton weaving.

I inspected the weavers and found them much more advanced than those of any other place. They have the improved hand-looms, by which the shuttle is jerked across the worm by pulling a string and lever, whereas elsewhere the shuttle is passed by the hand. This loom is also used in Koykulla in the same subdivision. The weavers can then work 2½ to 3 yards a day, whereas with the other form of loom a man can only finish about 1½ yards a day. The improved loom therefore works twice as fast. It has been in use in Serampore for about 40 years. It costs from R16 to R20, and can be made by a common carpenter. The Serampuri cloth is of a simple character, and sells at R1-8 for 5 yards, of which the thread costs R1, and the labour is 8 annas. The weavers earn about R8 to R10 per month, and are content. The weavers here also have an improved system of setting up the warp, the threads of the warp being reeled off a number of bobbins. It takes about a day to set up the warp. The cotton weavers seem to be in prosperous circumstances. The same improved looms are used for silk-weaving. The industry is almost entirely carried on by mahajuns, who supply the materials and pay the weavers 2 annas per yard. One mahajun that I saw had 17 looms at work. The silk comes from Midnapore and Bankoora. The woven silk is used for making handkerchiefs after dyeing and printing, but for the last four years English cotton handkerchiefs have caused the business to decline, as they are just as gaudy in colour and are cheaper.

28. There are three silk printing firms, but for the above reason the business is falling off. The handkerchiefs, when printed, are sent to Madras, Bombay, Mauritius and Burma. The dies for stamping are made at Nawabgunge across the river, and the clean cutting of the wood shows that these persons (there are only 10 or 15 of them) have great capabilities for wood-carving. The wood used is tamarind. The patterns are copies of Indian or English designs. The dyes used are madder, cochineal, and turmeric. The pattern is first stamped on in alum or sulphate of iron, and the cloth is then dipped in a madder, cochineal, or turmeric bath. The two former dyes are fast, made so by the alum mordant. The latter is not fast. The printed silks are, so far as I saw, very hideous. There are a few other firms in the suburbs. The silk before stamping is washed white with fuller's earth.

Colour printing.

29. *September 19th, Howrah.*—I visited Howrah and the Burra Bazar, Calcutta, to make further enquiries as to the cloth trade. There seems to be plenty of demand for country-woven cloth, especially for the Santipur embroidered cloths. They are used by natives as Sunday clothes, while English cloth is for every-day wear. It is impossible to make any speculations as to the comparative prices, as they vary so much according to the material and borders, etc. English cloth is sent to Santipur to be embroidered. The difference in price per piece for ordinary cloth of both sorts appears to be as R1-2 to R1-4.

Cotton goods.

30. *September 20th, Kanchrapara.*—I visited the Eastern Bengal Railway Workshops at Kanchrapara, where I met Mr. Rendell, the Locomotive Superintendent. There is no school for the men employed on the works, but there is an ordinary vernacular school near the shops, where their children can be educated. Nothing is being done to give the men employed any technical training except in the practical work, but Mr. Rendell is of opinion that it would be a good thing if they could be taught something of the theory of mechanics, so as to enable them to carry on their work intelligently, and not by mere routine. This is done in England by evening classes, where the men are taught drawing, the rudiments of mechanics, and the elements of natural science. Intelligent men, when they have received a start in this manner, can by means of libraries, etc., carry on their own education. In India it would be necessary to commence with the merest rudiments—in fact a sort of kindergarten, and lessons in physical and natural science should be given by experiments, diagrams, etc. A workman who could make a drawing of his work would be most useful (apart from the indirect value of his increased intelligence), because he could require less supervision and could also be sent to execute work at a distance. At present only two of the men engaged can make drawings of machines. The drawing to be taught need only be at first simple freehand and mechanical, with enough knowledge of geometric projection to draw plans and elevations. Afterwards sectional drawings might be taught, and then the properties of steam and heat. At first there would be merely object lessons. The terminology of mechanics would also be useful, but the use of improved tools could only be learnt by practice. Native workmen use the tools which are adapted to them; for instance, the Chinese carpenters use their own plans, which they think better than English Mensuration, or the means of calculating the cubic contents of material for forging, would be useful. I asked Mr. Rendell about the Seebpore students, and he said they were unsatisfactory, for the same reasons as were explained by Mr. Spring in his first note. The students are not sufficiently grounded; they are taught to read before learning the alphabet. Having hardly any knowledge of the common phenomena of nature, they are at once set to work to master books, and so gain only a parrot-like knowledge of the subject. From inquiries made, it appears that there are private establishments where drawing is well taught. Mr. Rendell said that the Seebpore students are not properly trained even in drawing. No theoretic knowledge of materials is required.

Eastern Bengal Railway Workshops.

31. *September 21st, Rungpore.*—I visited Rungpore, where an industrial school has been started by Mr. Skrine. It began with five pupils in February last, and now there are thirty. It is established on excellent principles. There are two classes. The first has sixteen pupils, who are Mahomedans, Kayasths, and Brahmins. They are chiefly the sons of foreigners to the district, as the local people are too orthodox to send their sons at present. The students have all had four or five years' education in the local High School, and have read up to the 3rd class, but are unable to continue their course up to the Entrance examination. They spend three hours a day in book-work,

Technical School.

learning drawing and mathematics, and five hours in the shops, learning carpentering and blacksmith's work alternately. The school is attached to the District Board, and the District Engineer supervises it. The Suder Overseer gives lessons in mathematics, and the District Board Head Draughtsman teaches drawing. There is a carpenter and blacksmith to teach the practical work. The tools and materials are supplied by the District Board, and the furniture made is sold at Calcutta prices, plus the cost of carriage. Half the proceeds go to remunerate the boys, and half to form a fund for their benefit. Surveying will be taught in the cold weather. There are very few local carpenters or mistris, and so the school supplies a real want. It is hoped that the boys, when they have completed the three-year course, will be useful for employment under the District Board or will obtain appointments in Railway workshops. The lower class consists of the sons of carpenters and mistris, who are only trained in the workshops.

It will be seen that the school has special advantages in being supported by the District Board. The school promises well, but I think the drawing class should be taught more thoroughly, and that the students should go through a course of free-hand and mechanical drawing before they go to the drawing of designs. It is possible that after a time the students may go on to the Calcutta School of Art to finish their training, while other pupils might go on to the Seebpore College.

Carpet weaving.

32. There is a large settlement of cotton carpet weavers at Nisbetgunge, a few miles from Rungpore. They are said to have been taught by Mr. Nisbet, the Deputy Commissioner, in 1830. There were over 500 families employed up till lately, but recently the business has received a serious check by the rise in the price of cotton. Cotton was brought from the Garo Hills, but it is said that machines for cleaning cotton have now been introduced there, resulting in a large export. The price of cotton has risen from R5 and R7 per maund to R14, and the thread now sells at ¾ a seer to the rupee, against 2 seers in the rupee. The weavers are employed by heads of families and work by the piece, getting two to four annas per cubit, in addition to food, according as the design of the carpet is plain or intricate. The designs are usually very simple, and there is little variety. The colours are chiefly blue and white. The men can finish about a cubit per day. The carpets are sold by weight, and are largely exported. The profits now are very small, and the increased price of the cotton has stopped the sale of the carpets. The weavers are now taking to agriculture. The carpets would be very useful for tents and officers.

Cabinet-making.

33. *October 12th, Monghyr.*—The specialities of Monghyr are fancy cabinetware inlaid with ivory, gun-making, locksmith's work, and mats and baskets. Native shoes are also made, and some stone work is done.

The cabinet-making is carried on by some ten families, who employ two or three workmen. It consists in the making of ladies' work-boxes, pen trays, walking sticks out of ebony inlaid with a design of ivory discs. This business used to flourish when there was no railway, and when passengers by river called at Monghyr. Now the articles are difficult to sell. The carpentry shows good work, but the fittings, hinges, etc., are most rough. The designs worked in ivory are simple and effective. The workmen unfortunately have not kept pace with the times and make only old-fashioned articles, such as desks, ladies' work-boxes, and watch cases. These things naturally find no sale. They should have books of designs and some opportunity of keeping up with the times. They complain that they cannot get new patterns. One man was making a carved pedestal for slate-topped table. The work was well done, but the design uncouth. The table was for native resident, and it appears that wealthy natives are willing to buy such articles of furniture. It shows also that there is room for the teaching of design and decorative art as applied to furniture.

Bidu Mistri is the chief workman, and his wares have been shown at exhibitions. The art of polishing the wood is roughly done with wax and turpentine oil.

Guns.

34. The town of Monghyr has long been famous for the manufacture of guns. The business has largely increased of late years. Formerly there were only five shops which sold guns at the surrounding *mêla*. This was stopped under the Arms Act, and the manufacture was almost extinguished. A demand for cheap guns, however, still continued, and was supplied from abroad through Calcutta. The Monghyr gun-makers continued to protest to the authorities against the disabilities imposed on their trade, and the export from Calcutta of foreign guns was, it is said, stopped. However this may have been, a demand sprung up for Monghyr guns, and now in the place of five shops there are twenty-five. They make single-barrelled guns at about R10 each. They no longer make their own iron, but import it. The barrels are made of ironrolled into a cylindrical shape, welded together and then bored. All the parts of the lock, including the small screws, are home made The old gun-makers object to the new shops which have sprung up and say that guns are now made so cheap that they cannot be safe. They even applied for an Inspector to test the barrels, lest some accidents from bursting barrels should discredit the whole trade. This seems a good idea, if only to secure the public, but the gun-makers should pay for the Inspector. He might also help them with advice as to new appliances for boring, though I noticed that the boring instrument is the same on a small scale as that used at the Burrakur Ironworks for boring pipes. Special makers also might have trade marks, and register them. I understand that all gun-barrels in England are tested and marked.

The shops work on a small scale with two or three workmen. More are called in when the are many orders.

A few shops make locks and padlocks and other articles of cutlery. In fact Monghyr, from its position near the Jamalpur Workshops, and the iron-producing tracts of the Sonthal Pergunnahs has a considerable business in all ironwork. The basket and mat-making industry is insignificant.

Near Monghyr are the slate and stone quarries of Messrs. Ambler & Co. The stone quarries chiefly provide ballast for the East Indian Railway. The slate quarries are not very remunerative, I am told. Messrs. Ambler & Co. profess to have some secret method for enamelling slate for table tops and other decorative purposes, but so far as I have seen, the enamel is not lasting, and I hear that there is little demand.

35. *October 13th, Assensole.*—I visited the Assensole district and was shown over the New Beerbhoom Company's coal mines by Mr. Grace, the Manager. The large companies have European assistants, who are mostly certificated miners from England, and there is an engineer to look after the machinery. A cooly on R8 per month works the engines. The coal is so near the surface (I went down the deepest mine, which is less than 300 feet) that none of the precautions necessary in English mines have to be taken. On the other hand, these are several small native mining companies; and all companies cannot afford trained European assistants. Many employ native assistants. There is a demand for native foremen, who will supervise the labour, and who can survey a mine and prepare a map of the workings. The actual work is done by coolies on contract labour. They can easily earn three annas a day, and will not work for more. There is probably a good deal of waste in their working, and it has not been found possible to introduce any system of blasting.

Coal Mines.

36. *October 17th, Ranchi.*—I visited the Ranchi Industrial School. It has good buildings on a good site, but has fallen into great decay. A separate report will be submitted regarding it, in accordance with Government orders.

Industrial School.

37. *October 19th, Dorunda.*—I inspected Mr. Curwain's Shellac Factory at Dorunda. He also reels tussar silk. There was nothing new to be seen in the Shellac factory. The lac after being cleaned of its dye in large stone vats (women are employed for this purpose, and they stand in the vats and work the lac and water round with their legs) is melted in thin bags before a fire, and is gradually squeezed out. It is then spread in thin layers over brass cylinders, and becomes shellac.

Shellac and tussar silk spinning.

For silk reeling Mr. Curwain uses a reeler invented by Mr. T. F. Peppe. The threads of three cocoons passed through a bored porcelain disc and through several glass beads. This gives a twist to the thread and equalizes the strain. It also removes irregularities caused by knots, etc. The thread then is wound off on a large wooden reel turned by hand, and so arranged that the threads pass from right to left and from left to right on the reel, and so form a regular skeins. The reel is made almost entirely of wood with wooden cog-wheels, and has been patented. Mr. Curwain has some thirty reels, and a hundred cocoons can be reeled off by each, daily. The machines are roughly constructed and might be greatly improved.

The tussar silk is largely exported to America for linings and other similar uses. The cocoon trade is carried on by jungly men, who look after patches of jungles. It is largely dependent upon the season, and latterly has been thrown into confusion by the action of certain large firms in Calcutta attempting to monopolise the trade. Prices rose, and the whole business was upset. Prices are now regaining their proper level.

There is a small business in stoneware. Stone plates, etc., are made and finished off with lathes, and are exported to Bankoora, Burdwan, and other districts.

38. *October 22nd, Raneegunge.*—A conference of the Managers of coal mines was held to consider the introduction of special instruction adapted to coal mines. A separate report of the proceedings has been drawn up.

Conference of Manager of Coal Mines.

39. *October 23rd—26th, Moorshedabad.*—I visited the Moorshedabad Industrial School. It is held in the Jubilee Hall, and is managed by the Sub divisional Officer and a committee. The school was started in 1885, and there are 57 boys on the rolls. The average attendance is 30. The school is held daily from 2 to 6 P. M. There are a few boys from the High School who attend after 4 P.M. The classes are as follows—

Lalbagh Technical School.

| | Boys. |
|---|---|
| Carpentry | 14 |
| Embroidery | 25 |
| Clock-repairing | 15 |
| Bidriware | 7 |

It is proposed to introduce tailoring. There are seven boys from the High School, including four Brahmin boys. They are learning clock-repairing and embroidery. The best boy is a Brahmin, who has been learning clock-repairing for three years, but he seemed doubtful if he would take it up as a profession. There are four boys from the middle vernacular evening school, but none from the same class of day school. The rest of the boys are from the pathsalas and maktabs of the city. There is a Brahmin learning carpentering, and several Kayasths are learning embroidery and clock-repairing.

There was a drawing class, but it did not succeed. Considering that the school only meets from 2 to 6 P.M. there would be no time for drawing.

The carpentry work is very rude. The head carpenter gets R7 per month for the half-day's work, and can design a pattern and work it out from drawing. But there are no fitting benches or other appliances, and the work done was not above the ordinary level. In fact no effort appears to be made to raise the standard.

The embroidery class works on the old patterns and designs. The work seems one very uninteresting for boys and for educated labour. If any training is required, it should be in the direction of patterns and designs. The clock-repairing is chiefly in the hands of a headman, who had learnt the work in Calcutta. He does not attempt original work, and has an insufficient supply of tools. The bidriware class is an attempt to revive the art of making this ware, which, owing to the exclusiveness and lethargy of the original artizans was likely to die out. The designs and tracings are old fashioned, but a boy quickly seems to learn the art of making the design and executing it. The results are, I fear, too expensive to command a large sale.

The boys go from one class to another, which, considering how diverse are the trades taught seems a pity.

The school is supported by the Municipality and by subscriptions. The income and expenditure are Rs. 45 per month, and subscriptions are raised to buy materials, and for prizes. The school has little vitality, and its educational functions are small. No boys have yet left the school, so that its results cannot be estimated.

The chief industries of Moorshedabad district are the following :—

Silk filatures.

40. Silk filatures or reeling the cocoons of the mulberry silkworm.—The work was not going on when I was in Berhampur, but I visited Mr. Stock's factory to see the machinery used. It is of the most primitive kind. Mr. Stock informed me that they had tried all the European appliances, but had found that the old native methods were the best adapted to the Indian cocoons. Italian and French machines are adapted to the cocoons there reeled, because the thread is tougher. Mr. Mukherjee informs me that there is a new machine invented in France, which will be of great use when it can be introduced, but it is at present the subject of litigation.

Silk spinning is chiefly carried on in the factories where the cocoons are bought. A few villagers reel their own silk.

Silk weaving is carried on to a considerable extent in the district, but the native weavers have no means of making the thread properly or giving it a regular twist, and the silk is not of great commercial value. The looms used are of the old-fashioned type, but this is no great disadvantage, as I notice that all Lyons silk is made by hand-looms.

Silk weaving.

41. There are two weavers at Baluchur near Azimgunge, who make silk shawls with figured and embroidered borders. Their work is very good. I saw some pieces of silk butedars, as they are called, and there are very fine specimens in the Calcutta Museum. The art, however, is declining and there is little demand for it on account of the price.

Ivory carving.

42. Ivory carving is a speciality of Moorshedabad. It is carried on by a few artists, who keep the industry carefully in their own hands. The work requires vast skill and training, and some 80 tools are employed. The men will only work for advances and then they are so dilatory that the business is declining. There might be a chance of the revival of the art if the goods could be introduced to the public.

Bidriware.

43. The art of "bidri" ware is, I am told, confined to four families. It is also taught in the industrial school. The men are very lazy workers. At the recent exhibition it was with great difficulty that specimens were procured. The men said that they could not work for more than two hours a day. Hukkas, spittoons, covers for hukkas, and plates are the chief articles made. The work is very good, but too expensive for general use. The metal is made of zinc, copper, and lead, inlaid with silver and blackened with sulphate of copper. It is finally polished with a fluid made of saltpetre, two parts, and sal ammoniac and sulphate of copper, one part each.

Quilts.

44. Quilts, called balaposh, are a speciality of Moorshedabad. I saw some, and beyond the fact that they were light and warm and in pleasant subdued colours, I did not see any of special merit in them. They are made with an outside covering of muslin. If Decca muslin of an inferior quality is used, they are more expensive than when English muslin in used.

Bell-metal ware.

45. The preparation of bell-metal ware is a special trade in the Kagra bazar, near Berhampur. There are some 25 firms, each employing a number of men. The ware is made of a pure alloy, and fetches R2-8, R3-8 per seer. The goods are exported. I was unable to see the process, as the shops were closed on account of the Kali Puja; but, so far as I could ascertain, it did not differ from that employed in other places. It is said that the workmen have introduced many novelties which find a ready sale. I saw some ordinary tea cups and saucers in bell-metal which do not seem the right development of the art. The bells made are very good.

There is a considerable business in ironwork at the Jungypur subdivision. Locks, keys, and spear heads of good quality are made.

East Indian Railway workshops.

46. *October 26th, Jamalpur.*—I visited Jamalpur to examine the system of training workmen in the East Indian Railway Workshops, and had an interview with Mr. Strachan, the Superintendent. The East Indian Railway commenced at first with introducing foremen from England, who have trained the large staff of workmen. The latter were obtained in large numbers from Monghyr (which has always been famous for its iron workers, and the neighbouring districts. The consequence is that there is now a large staff of skilled workmen—about 3,000—who are employed at rates lower than those in other railway workshops. The latter have obtained their supply from Jamalpur, and a regular system of training is thus in progress. Foremen are now obtained from apprentices—the sons of Europeans employed in the workshops or on the railway. These boys attend the railway school up to the age of 16, and then are admitted to a five-year apprenticeship, if they can pass an examination in English and Mathematics up to decimals and compound proportion. During the period of apprenticeship they attend evening classes. Attendance is obligatory. The boys are then regularly engaged, and may rise to be foremen, if otherwise qualified. It does not appear that anything is done to give the boys a special technical training. The preliminary examination is purely practical, and at the evening classes no mechanics or science is taught. If a boy shows a taste for drawing, he is allowed to study it in the drawing office. Mr. Strachan said that this absence of technical training was to be regretted. It was chiefly due to the difficulty of procuring a qualified master. If a teacher could be procured, he would be glad if the apprentices had some technical instruction which would fit them for their duties.

As for the artizans, it is not of course to be expected that any large number could profit by technical instruction, but there are always men of special intelligence who would be glad to take advantage of it. Mr. Strachan recommends the introduction of evening classes to teach selected mechanics drawing and the principles of mechanics and machinery by diagrams, sectional drawings, and object lessons. They should also see experiments in the ordinary phenomena of science, and would thus get an insight into the principles of mechanics and of physical science, which would enable them to work more intelligently. As an instance he gave the case of a screw-cutting machine. To make a particular size of screws, a workman will put on certain gear because he has seen the foreman do so. If he understood the principle of the machine, he would work it intelligently and be saved from stupid blunders. Workmen at present enter as boys under their fathers, and gradually learn their work without any special training.

The principle of evening classes is not new. There are such classes held now for enabling firemen to learn reading and writting so as to rise to be engine-drivers. Mr. Strachan said it was with great difficulty that they were induced to attend and pay their 2 annas a month, and thus in the evening classes for mechanics every encourgement would have to be given, at least at first, and all the books and drawing materials would have to be provided for. The necessary teachers could be supplied locally. Thus the head draughtsman could teach drawing, and there were other clerks who could teach mathematics and science. Mr. Strachan would not object to the admission of outsiders to the classes.

I could not gather from Mr. Strachan that mechanics who improved themselves by attendance at the classes would get much higher pay. The average pay R12 to R14 per month. There are only five or six men who get over R25 per month. These are men who can supervise others, can test measurements, and see that the men are w rking according to the scale of the pattern. Several workmen can work from drawings and even graduate by scale. They have picked up their knowledge from the foreman, and have learnt the English figures. They are allowed in the drawing office if they show a taste for the work. It is not necessary to teach the nature of metals or chemical analysis. A special officer must be retained for this work. Mr. Strachan agreed with Mr. Spring's views that improvement in workmen must be looked for from improvement in the foremen class.

Opium godown saw-miles.

47. *October 28th, Patna.*—I visited the saw-mills attached to the opium godown, as it appeared probable that some kind of a technical school might be attached to the workshops connected with them. Mr. Girling, the Superintendent, approves of the idea, and would be ready to entertain twenty pupils who might attend for three hours a day from the Patna College or High School. He would train them in drawing and in all kinds of carpenter's, blacksmith's, and joiner's work. He would also make them conversant with the working of the steam-engine and generally of machinery. He would be willing, if Government approved, to take in apprentices at R3 per pupil. The course should last at least two years. One special branch of training would be the making of drawings of machinery and of models. The training would therefore be the same as that employed at Birmingham for training artizans. The saw-mills do not provide for much variety of work, but there are always repairs of various parts of the engines and other odd jobs going on which would give opportunities of training students.

Glass trade, etc.

48. *October 29th, Patna.*—Patna contains every kind of industry, but none of them are of special importance or extent. Patna glass has obtained some notoriety. A very large amount of bottle for scents, and glass lamps for illumination, and glass bangles are made out of Sone sand mixed with soda (*khari*). The glass produced is green and impure. There are two workmen who work up broken English glass, and their wares are well known. They make pure white glass vessels from broken railway lamp glass. Ordinary English glass turns milk-coloured when re-melted. They colour their glass with sulphate of copper, or with indigo blue, or with tin (*runga*). The process of melting is very simple. A furnace with a blast is prepared. The broken glass is mixed on a blow-pipe or rod of metal and melted or softened. It is then pressed or blown into the required shape. The annealing chamber is over the furnace. The men have great skill in making shapes, and designs have been supplied them by various officials. They say that if they could afford to set up a factory to make white glass, they would do a great business. They want a lakh of rupees for this object, but no one is willing to advance the amount, as they have not a good reputation for performance of contracts. At present they work almost entirely on advances.

Dinapore cabinet-makers.

49. Patna and Dinapore are celebrated for workers in wood. The carvings in the balconies throughout the towns attest this fact. In Dinapore there are some 200 carpenters, who turn out a large quantity of furniture and other cabinet work. I visited the shop of Mr. Watling, where furniture is made under European supervision. Nothing, however, is done to improve on native methods. I found men planing wood without vice and clamps, and utilizing their toes where European workmen would employ some special contrivance. The quality of the work, however, is very good. The furniture made is largely in request among native gentlemen, who are, it appears, beginning to furnish their homes in European style. Mr. Watling says they are better customers than Europeans. The men cannot, as a rule, work from drawings, and the articles made show no variety, but adhere to the old conventional patterns. A drawing school and school of design attached to the Dinapore High School might introduce great improvements. Both in Dinapore and Patna a large number of carriages and dog-carts are made. Mr. D'Abreu has a large workshop, where he has trained a number of men in this work. The work seems of a high quality, and some 30 per cent. cheaper than Calcutta carriages.

50. I had an interview with Mr. D'Abreu, who has taken great interest in the training of native workmen. He introduced some apprentices into his shop, and says that the Director of Public Instruction promised to grant a subsidy if his plan succeeded. He says that the great difficulty in getting educated lads to learn a handicraft is in the absence of prospective employment. It is no use to establish a training school without ensuring profitable employment to the students. They

have no capital of their own. He suggested that Government should supply students, on loan, with the necessary capital. If this were done in a few instances, a good start would be made. Government would be sure to recover the money lent, if the loan were made to men thoroughly qualified and with the approval of the local authorities. The amount required would be R1,000, and there is less chance of this money being wasted than if spent in elaborate school buildings, in stipends, or otherwise in industrial schools. An important industry in carriage-building, furniture-making, and cabinetware might then be started. All the raw material is present, except perhaps blacksmiths, who are not good workmen in Patna.

Brass working and stone-carving.

51. *October 30th, Gya.*—There are several industries in Gya, such as paper-making, silk-weaving and carpet-making, which are carried on in the district. They are said all to be in a declining state. In the city, brass utensils are made. There are a few workmen—five or six it is said—who understand the art of brass-chasing and produce work not unlike that done in Benares. It is probable that with a little encouragement they would produce brass work equal to that of Benares. Copper-chasing is more common, and is applied to the production of small plates, etc., as mementoes for pilgrims.

There is a large trade in stoneware. Cups, bowls, and platters are made in great quantities at Patalkatti, a village some six miles from Gya. The stone is a description of granite, which is coloured black with a preparation of oil. It is turned on a lathe, and takes a fine polish. The first polish is made with a chisel. Then sand is used. Lastly, a mixture of the corundum stone and of lac is used.

The industry was imported from Jeypore when the great temple of Bishunpud was built. There are five or six workmen, who make small stone carvings of animals. The most skilful of these has recently migrated from Jeypore. The art was, it is said, introduced some forty years ago by a Collector, Mr. Macleod. He gave the workmen designs. They have since made little progress owing to the lack of designs to copy. They say that they could make figures of any size if they only had the drawings or designs. They work with simply a hammer and sharp pointed chisel of steel.

Common earthen pots are painted and are largely purchased by pilgrims.

52. *November 1st, Mozufferpore.*—I had an interview with Mr. Butler, who is head of a firm of engineers engaged in supplying and maintaining engines in indigo factories. He says that there is a great want of men capable of fitting up and looking after factory engines. Men are gradually being trained, but at present untrained miscries are imported from Bengal. It would be a great advantage if some central institution could be established where competent mechanics could be trained, but the work in factories is only for a few months of the year, and is so scattered that it would not be possible to start such an institution in Behar.

Tirhoot State Railway Workshops.

53. *Somastipore.*—I had an interview with Mr. Cardew, the Superintendent of the Workshops. There are some 800 workmen with two European foremen and four leading hands on R80—100 per mensem. For the latter class apprentices are trained, but the training is only practical in the work of the shops. They are Eurasians and go through a five-year apprenticeship. They have no special training in drawing beyond what they can pick up in the course of their work. Mr. Cardew would introduce a more special technical training for these apprentices, and would teach them drawing (mechanical), the principles of mechanics, and elements of physical science. He would have examinations, and certificates might be granted on the results. There might also be examinations in practical work, as in the Whitworth scholarships, where students are told to make a nut (whence it is seen if they know how to use a file), or some other simple test is applied. He does not see how this training could be extended to the mechanics, but evening classes might be attempted. He would object to the admission of outsiders, at least into the shop. There is a draughtsman who could teach the drawing class, and an estimator who could teach the mathematics. He mentioned the case of a Bengali estimator who had asked to be allowed to gain some practical knowledge of the work by manual labour in the shops.

Burrakur Iron Works.

54. *November 2nd.*—I visited the Burrakur Iron Works, where the Superintendent, Ritter Von Schwartz, met me. He is of opinion that, except where physical strength is required, the native workman is superior to the European. He has trained a large number of men, and employs over 800 men in the works. He has only three European subordinates, whereas the old company had over 25. He has taught a number of workmen pattern-making. These men were carpenters from Arrah, and they have learnt to draw out a pattern to scale from a simple drawing and to carve it in wood. Some of the patterns required for ornamental gates, railings, etc., are most elaborate; but these men with no previous training readily learnt to draw them out according to scale, to allow for shrinkage and to carve them in wood for the moulds. In some cases they have made original drawings, and have worked them out in detail. A few men have been taught by the Superintendent to make analyses of iron, coal, etc. They have, of course, only learnt to do this mechanically without any knowledge of principles, but the Superintendent said that the work was always accurately done.

E. W. COLLIN,
*On Special Duty.*

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## APPENDIX III—*see paragraph 63.*

NOTES OF A CONFERENCE HELD AT RANEEGUNGE TO CONSIDER THE QUESTION OF THE EXTENSION OF TECHNICAL TRAINING TO THE COAL MINING INDUSTRY IN BENGAL.

There were present the following gentlemen:—

Mr. E. N. Grace, Manager of the New Beerbhoom Coal Company.
Mr. S. Bayley Wells, Manager of the Bengal Coal Company.
Mr. C. Earp, Manager of the Damuda Coal Company.
Mr. Agabeg, Manager of the Alipur Coal Company.
Mr. Veasey, Manager of the Burrakur Coal Company.

2. The question of training men to be Assistant Managers was first considered. It appears that the majority of such Assistant Managers are now brought out from England, where they have obtained mining certificates. It was agreed by the gentlemen present that it would be beneficial to the mining interest if Assistant Managers with sufficient training could be procured from the families of domiciled Europeans. Managers would not be unwilling to employ Eurasians and Natives if they were qualified, and were after trial found fitted for the work. The advantages of having a supply of trained Assistants in India were stated to be the following. They would have a knowledge of the language and of the people. They would be available whenever required. There would be a saving of expense, as, in addition to saving the cost of bringing out Assistants from England and sending them back, domiciled Europeans would probably take the appointment on lower pay. It was considered probable that the cost of the services of Assistants from England would be raised in the near future in consequence of the development of the trade in England. On the other hand, the development of the mining industry in India will render it necessary to employ more Assistants. At present mining in India is in its infancy. It is rapidly extending, and, with the better railway communications which will shortly be available, will be largely increased. Even, at present, the Manager of the Damuda Coal Company said that he could employ five more Assistants, and the Manager, of the Bengal Coal Company would take ten. The want is felt, not only of regular Assistants, but of trained Sub-Assistants, who would take the place of the untrained native Sub-Assistant who is now employed. Such trained Sub-Assistants would eventually rise to be Assistants and possibly to the post of Manager.

3. It was thus agreed by the Conference that if a scheme were instituted for training youths, whether European, Eurasian, or Native, in the principles and practices of coal mining, there would be plenty of appointments available, and that the number of such appointments would increase as the coal industry extended ; so that in the course of five or six years (which would be occupied by the working out of such a scheme) it was estimated that there would be from fifteen to twenty appointments available yearly.

4. The question of the nature of the training to be given was then considered. It was agreed that the course should be similar to that in England, *viz.*, three years' training in the school and two years' training as apprentices in the mines. Boys should only be admitted to the course who had attained a certain standard of education, and the age of admission would be 15 or 16. The course of study at the school would be similar to that necessary for the examination for a certificate in mining in England, but considering the simple character of mining in India at present, that course might be reduced. It would include the subjects mentioned in Dr. Saise's letter (Appendix IV) or such as might be selected by a Committee of educational experts.

5. The course should be approved by a Committee of experts, and examinations would be held. It would be convenient to allow a Committee of the Managers of coal mines to supervise the examination questions, so as to secure that the examinations are thoroughly practical.

6. After three years in the school, the boys would be admitted to the mines as apprentices for two years, to learn the practical side of their work. They should also have an opportunity of working in the workshops under the Engineers, so as to acquire some practical knowledge of machinery, the testing and repairs of engines, etc. After two years' apprenticeship, the students should either pass a second examination, or should receive certificates of proficiency from the head of the mine where they have worked, and they would then be available for employment.

7. The question of the location of such a school was considered, and it was felt that it would be best to have it at Assansole or some place near the mines. At any rate, the boys must be kept under sufficient discipline while undergoing their three years' course. It was said that the proprietors of mines would probably support such a school by scholarships, and they would be willing, at least at the outset, to take the boys in as apprentices without a premium. They would not, of course, bind themselves to grant a certificate of proficiency to all apprentices, and some failures must be anticipated.

8. The question of training native mechanics in the workshops was considered. At present these men get only a practical training, and it was agreed that, though it would be beneficial if some technical instruction in mechanical drawing, elementary physics, etc., could be imparted at evening classes or by lectures, or other means, yet the scattered positions of the workshops and the character of the men employed rendered it improbable that any such scheme would for the present be successful.

E. W. COLLIN,
*On Special Duty.*

*The 22nd October 1899.*

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APPENDIX IV—(*See paragraph 63*).

Dated the 8th November 1889.

From—Dr. WALTER SAISE, M.I.C.E., Manager, East Indian Railway Collieries, Giridhi,

To—E. W. COLLIN, ESQ., C.S., on Special duty.

In reply to your No. 36 of the 4th instant, I have to state that I will attend to your request soon after my return to Giridih.

As the subject is one of great interest to mining men, and promises to have some influence on the future of Indian mining, may I suggest, if you have not yet done so, that you ask for the opinions of—

Mr. J. A. Maughan, Manager, Government Collieries, Umaria, Central Provinces, and Mr. Turner, Manager, Makum Collieries, Assam Trading Company *viâ* Dibrugarh.

Mr. Kirkup, Manager, Singareni Collieries, Deccan Mining Company.

No. 18.
Arts and
Industries in
BENGAL,
1889.

All the above are men specially trained and certificated under the English Mining Act of 1872.

In Bengal in addition to those with whom you conferred, there are Mr. Turnbull of Giridih, Mr. Hall of Giridih, Mr. T. H. Ward, also of Giridih, who having gone through a mining education and training, and have spent some years in this country, are well qualified to assist in your deliberations.

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No. 906, dated the 11th November 1889.

From—Dr. Walter Saise, M.I.C.E., Manager, East Indian Railway Collieries, Giridih,

To—E. W. Collin, Esq., C.S., on Special duty.

In continuation of my letter of 8th instant, and with reference to your No. 36 of 4th idem.

The establishment of a special school appears to be quite unnecessary. For a considerable period the training that does for a Civil Engineer or a Mechanical Engineer will suit equally well a boy who is to enter mining as a profession. The training, therefore, at Roorkee or Sibpur is quite suited for the first two years' course during this period.

Two years.
1. Mathematics and pure Mechanics.
2. Applied Mechanics and Physics.
3. Plane and solid Geometry, free hand and mechanical drawing.
4. Surface surveying in all its branches, plotting of surveys in all its methods, etc., etc.
5. Geology, pure and applied.
6. Chemistry with special reference to metallic, mineral, coal and fire clays and gases occasioning in mines could be studied.

For the third year—

4a—Mine surveying and plotting.

7. Principles and practice of mining England and other countries with visits to mines, say once a week.
8. Steam and steam-engines.

This could also be done at Sibpur or other engineering centre, or students might spend three months at Assansole or some central spot during the last or third year.

In my opinion a practical miner is just the person who should not give lectures on mining. The best lecturers in England are Professors W. W. Smyth (School of Mines), R. R. Brough (School of Mines), C. M. Percy (Urgan), Mr. Munro (Bristol Mining School), and none of these have ever had charge of mines. The collection and collation of mining data from all parts of the world takes up the lecturer's time sufficiently. The only thing that can be taught in school are the principles of the profession and comparison of different methods in different countries—knowledge that will become very valuable as the students become practical.

A Urgan School or Bristol Mining School or London School of Mines student should be mported to lecture on mining and steam-engines and underground surveying.

The two years at a mine,—by this quarries should not be meant, as nothing of mining can be learnt in them—would form a fitting end to a training; and with a certificate of satisfaction from the Engineer in charge of the collieries (not quarries). I have no doubt sufficient employment would be found for trained men, whether Anglo-Indians, Eurasians, or natives.

It would perhaps be better, however, for the college or school to grant certificate after five years' training on passing an examination. The examination to be conducted by a mixed board of educational and mining experts. This would ensure that favoritism had no place in granting of certificate.

For workshop men (mistries, etc.) lectures in the vernacular would be necessary, and unt natives are trained to give these lectures, I see no chance of their success.

I beg to give a revised "course" of training for mining students.

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Course of training for Mining Students.

I.—Mathematics and theoretical Mechanics, comprising—

Arithmetic.
Algebra, up to Binomial Theorem.
Trigonometry, Solution of triangles.
Euclid, Books I, II, III,
Statics, Hydrostatics, Dynamics } as at Sibpur.

II.—Applied Mechanics.

III.—Drawing—

Free hand.
Plane Geometry.
Perspective.
Solid Geometry and simpler problems of planes and their intersections.
Mechanical and simple architectural drawing.

IV.—Surface surveying in all its branches—plane table, prismatic compass, chain and theodolite, setting out curves, levelling, mine surveying (third year's course).

Plotting and planning.

V.—Geology, pure and applied, and Mineralogy.

VI.—Chemistry of metalliferous minerals, coal and fire clays and gases met with underground.

VII.—Principles of mining (third year)—

Sinking, drifting, winning and working of coal and other deposits, ventilation, haulage and pumping.

VIII.—Steam and steam-engines of all kinds used in mining, and (third year).

Use of indicators.
Dynamometers, etc.

WALTER SAISE, M.I.C.E., D.Sc. (*London*),
*Associate, Royal School of Mines, London.*

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## APPENDIX V—(*See paragraph 69*).

Dated the 15th March 1885.

From—MESSRS. J. H. D'ABREU & CO., Builders, Contractors, and General Agents, Patna,
To—The Inspector of Schools, Behar Circle, Bankipore.

Availing ourselves of the encouragements held out by the Government in the way of promoting technical education, we beg to submit the following for such consideration as may deem it worthy of.

From our experience in working contracts, etc., in the district, it could not but strike us very forcibly how very advantageous it would be to the Government and the public at large (now that State railways were being so rapidly opened out in the province) if an attempt could be made to impart technical education.

It will, we believe, be admitted that the majority of skilled labourers now employed by Government directly or through the agency of contractors are recruited from Calcutta. We leave you to realize how costly that labour must be when it is admitted by Calcutta firms that their workmen earn such high wages that they can afford to work for three days in the week and play the other three, hence the inducements that bring them to work in distant lands must be greater than those which operate on them to work at Calcutta.

From our experience in the matter we find that after we have undergone the initial outlay for instructing our workmen, we can turn out certain descriptions of work at Patna at about a fourth of the cost it can be done at Calcutta.

With appropriate aid from Government we find ourselves in a position to impart practical instruction in the following branches:—

*Carpentry.*—Under this heading we include all the ordinary descriptions of work required by Public Works Department, ordinary coach building work, cabinet maker's work, and upholstery.

*Forging and Blacksmith's work.*—All sorts of heavy work required of contractors and fitters, coach-building work and the manufacture of agricultural implements used by planters and farmers, municipal carts, and vehicles.

*Painting.*—House and carriage painting, also sign painting, staining and graining.

*Electroplating.*—The depositing of silver, copper, brass and zinc on the coarser metals.

*Brass work.*—The moulding and casting brass.

*Upholstery.*—Under this head we include all descriptions of padding and cushion work for furniture, carriage, etc., etc.

*Brick and tile-making.*—In this Department it is our object to show how the later improvements may be associated with the indigenous mode of manufacturing these materials, and subsequently to introduce the art of glazing.

*Turning.*—Turning on the lathe, wood, iron and brass, and the use and application of the various tools and attachments for it.

*Drawing.*—Of such an elementary nature as will be of service to the subordinates in understanding plans and expressing their own practical ideas of work.

*Printing and Lithographing.*—The training of compositors, lithographers, and pressmen.

*Leather work.*—The manufacturing of harness, travelling cases, and other articles of general use.

To the above may be added tinsmith's work, pottery, ink manufacture, French polishing, varnishing, manufacture of varnishes and polishes, and working in leather, masonry and lime manufacture, photography, and we may further on open a class for teaching agriculture after the style of English farmers.

Instead of dwelling too long on these details, we shall put our scheme into a more definite form so as to enable the Government to judge of its merits:—

We take it upon ourselves—

| | | Monthly expense. R |
|---|---|---|
| 1. | To supply a suitable building for the purpose | 40 |
| 2. | To provide a carpentry teacher and class | 25 |
| 3. | " " a blacksmith's forge " | 25 |
| 4. | " " a class for teaching painting | 30 |
| 5. | " " " " electroplating | 25 |
| 6. | " " " " brass work | 20 |
| 7. | " " " " supervision | 100 |
| 8. | " " subordinate teachers | 50 |
| 9. | Tools and materials to the extent of | 140 |
| 10. | Chowkidar, sweeper, and servants | 25 |
| 11 | A class for teaching upholstery | 20 |
| | | 500 |

12. We will permit pupils to inspect work being done in our workshop, and the work done by them will be our property.

Under these circumstances we beg to enquire if we carried out the above scheme, what aid the Government are likely to give for such an institution.

The advantage resulting to Government would be the following :—

That while Government pays for a single workman in each department of work, the pupils would gain the practical experience resulting from seeing a large number of men working in that Department in our premises.

That Government would not have to provide tools and plant necessary for such an institution, such as lathes, drilling machine, forges, anvils, bellows, vices, batteries, etc., etc.

That Government would gain a large amount of materials for the pupils to work with, which in an independent Government institution would have to be purchased at the original cost, prices but which to us is only scrap material.

The work being of a varied nature, the cost of supervision to Government would be very much greater if the school were to form an independent institution of its own.

Submitting the further maturing of the question to your consideration.

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Dated the 2nd November 1889.

From—J. H. D'ABREU, Esq., Head Master, Patna City School,
To—The Inspector of Schools, Behar Circle, Bankipore.

As I have come to learn from Mr. Collin (who very kindly inspected my workshop on behalf of Government) that the Government are collecting information with a view of introducing a system of technical education, I have the honour to submit the following for your information.

As you are already acquainted with what has been done by me in the way of utilizing the materials and technical labour available in this local market, and combining the two together in a remunerative manner, as also the success which has resulted from it, an opinion from you will therefore be of much effect.

If I correctly understand the object of Government in trying to develop and diffuse technical knowledge, and if it be in contemplation to put the youths now being trained at Government schools in the way of obtaining means of livelihood by utilizing the material produce of each locality with the help of local labour, I fancy the following considerations may possibly be of some value.

The keeping up of schools simply for the purpose of imparting technical knowledge being a very expensive matter, ways and means should be found to impart this knowledge in the absence of regular schools.

With the progress of education and civilization, there is a growing demand for the necessaries and requirements of civilized life and civilized society, and in supplying the wants of such a society must the future technical man find the ways and means of his livelihood.

This demand, it hardly need be mentioned, is supplied from various European countries but yet in spite of it, there is a wide field where local technical labour can be utilized for this purpose.

The present generation needs better dwellings, and surroundings, better furniture and equipage, and much more of the comforts of life, in order to be on a level with the high stage of mental development. And though a great amount of this demand can be supplied by means of importation, it is in the economy resulting from local manufacture that the industrial agents of the future must expect to find a living.

To supply this demand, it would need the following agencies :—

| | |
|---|---|
| Trained workmen. | Capital, etc. |
| ,, supervisors. | Vendors. |

The manner in which Government could encourage the introduction of technical education would be to induce private individuals to open workshops and sale-rooms in the vicinity of Government schools, where the requirements of the present state of society could be manufactured locally and where foreign manufacture of a like nature should be imported and offered for sale (these imported articles serving also the purpose of samples for imitation).

That in return for Government aid and patronage it be stipulated that such firms undertake to admit pupils desirous of inspecting and learning the work. The firm utilizing the services of these pupils as apprentices and helping them to open small firms of their own after they have learnt the work.

That Government advance these firms with capital on reasonable rates of interest on their affording proper security for the money.

That pupils be allowed to attend the Government schools free of charge on condition of their submitting to a course of training for a certain number of years in one of the technical firms.

Under this system Government would simply have to provide capital for which the firm would find security.

If the Government consider it worth their while to experiment such a system, the undersigned would be very willing to work it for them.

## APPENDIX VI—(*See paragraph 13*).



### NOTE ON COPPER, BRASS, AND BELL-METAL WORK.

Vessels of brass are chiefly used by Hindus, and of copper by Mahomedans. They are made either by casting and moulding, or by joining together pieces of beaten out metal. Moulding is the cheapest process, but buyers prefer beaten out vessels, because they can be more sure of the purity of the metal. The natives understand the difference in the quality of the metals, that known as Russian copper being preferred. Copper is bought in sheets or tiles or scraps. Brass is also bought in sheets or scraps, or is manufactured. Bell-metal is always manufactured, and costs R35 to R36 per maund. Brass may be bought in sheets at R40 per cwt., while the materials cost R20 to R23, but the braziers prefer to buy the sheets to save labour, and because they get them of uniform thickness. On the other hand, a sheet of brass when beaten out into a lota becomes thinnest at the base and corners, where most wear and tear take place, so that buyers prefer the vessels made of brass manufactured by the workmen, when this objection can be obviated.

The process of the manufacture of brass is as follows:—Copper and zinc are smelted in a clay crucible (moonchi). First class brass is 4 parts copper and 2 parts zinc; second class is 3 parts copper, 2 zinc, and 1 lead; third class brass is 2 parts copper and 4 spelter. This is called 'bharan' and is very cheap. Articles of the two latter classes must always be cast. The clay crucible is only available for one working, and plumbago crucibles would be better. To ensure proper smelting, the crucible must be annointed with oil, and fusible materials, such as scraps of jute stalks, are burnt in it. This prevents air bubbles and gives a smooth surface. The melted metal then is poured into small vessels (chaur) made of clay mixed with jute scraps, which have been previously oiled. Each holds about ¼ seer. A little borax and salt is thrown with the metal into the moulds to purify it. The metal when cooled is again heated and beaten out. If a large piece of brass is required, several nuggets of brass are beaten out, one on the top of the other, and welded together. The English market now supplies sheets of brass, which are much bought. The brass might be made into sheets of the required thinness by rolling, and it would be an advantage if circular pieces of metal such as are required for making brass vessels could be supplied.

If vessels are to be moulded, the materials, either copper, or copper and zinc for brass vessels, or copper and tin for bell-metal vessels in the requisite proportions, are melted down and poured into the moulds. Moulds are made of suitable clay mixed with scraps of jute stalk, and in some places with rice or wheat husks. Sometime a wooden mould is first made and the clay mould built round it, or a brass figure already made is used to make the impression in the clay. For making the finer moulds as at Ranaghat, wax figures are encased in the clay and the wax is then melted out. The workers in brass figures, however, have great skill in modelling, and seldom require helps of this sort.

In making beaten out vessels, the various pieces, generally three or four, are beaten out to the required shape and welded together. To ensure their fitting together perfectly, a solder of melted zinc or zinc, brass and borax is added to the weld, and the whole again heated and beaten together.

Works in these metals do not confine themselves always to making vessels for use. They can mould figures, supports for hukhas, and other articles. One man whose shop I visited in Calcutta was at work on a mould for the foot of a bed post which was to be a tiger's head. He had had no tuition in this art, and said he had learnt it from his father and grandfather. The moulders of figures get ideas from pictures which they see in Calcutta, and one man in Santipur had designed and moulded a Hindu goddess with an angel's wings—an exceedingly good piece of workmanship.

Bell-metal beaten out work is more difficult, as the metal can only be beaten when heated It is extremely brittle, and if not beaten when hot breaks readily. When beaten out, it has to be tempered by making it red hot and cooling it in water. I am informed that two European gentlemen in Calcutta have succeeded in beating out sheets of bell-metal, and then in making vessels by dies, which take a fine polish. The workmen of Kharar in Midnapur are the only men who can beat out large plates of bell-metal, but this is due to the use of inferior metal, and their wares sell at cheap rates. Bell-metal cannot be welded together, at least there is a strong superstition against the practice.

Small brass articles, such as hinges, nuts, etc., are made by moulding at Kamarpara in Calcutta.

The final process in all vessels is the filing and polishing. It is necessary to reduce moulded articles to a particular thinness, to take off inequalities and to procure a polish in all manufactured articles. This is done on a lathe. The article to be operated on is fixed on a lathe with shellac, and while one workman turns the lathe, the other planes it with a sort of chisel.

This is one of the few industries which has not suffered from competition with machine-made articles. An attempt has been made to introduce machinery into the business by one Tara Kali Chatterjee in Bagbazar, Calcutta, and by Mr. B. P. Chowdhuri at Moheshgunge, Nuddea. The former had his wares boycotted, and I visited the factory of the latter, and found that he now confined himself to making requisites for indigo factories, such as screws, pumps, etc. He has a factory employing 40 or 45 men, with English machinery for turning screws, a lathe, a steam hammer, and a small hydraulic press. The steam hammer would be useful for beating out brass sheets, but it requires more steam power than his engine—a four-horse-power engine—could supply. The steam hammer is useless for beating out bell-metal, as the heat of the metal is transmitted to the hammer, and then the metal cools rapidly and is liable to fracture. I was informed, moreover, that it was difficult to introduce steam lathes for polishing vessels, as it takes a long time to centre them on the lathe, and in addition the lathe works too rapidly for

successful polishing. Much might apparently be done by the introduction of dies. Mr. B. P. Chowdhuri had several dies and a small hydraulic press with a pressure of 10 tons, and he was able to manufacture rapidly articles of simple shape, such as plates, cups, etc., but a difficulty arose in regard to vessels like lotas, whose circular and bulging shape forbade the use of dies. I understand that it was in consequence of the use of dies that Babu Tara Kali Chatterjee was boycotted in the bazar. The difficulty arising from the bulging shape of vessels referred to above could be met by making them in pieces, but it is doubtful if the natives would buy a lota so made up, and if the workmen would be able to afford to purchase hydraulic presses. I may note, however, that several native firms, which I visited, were in the hands of men with capital, who employed a number of workmen under them, who work by contract. Such firms could at least afford a screw press, which would probably be sufficient. An ordinary brass worker near Calcutta, who does not employ, labourers under him, earns about R10 per mensem, and if he can secure this, he will not try to earn more.

E. W. Collin,
*on Special Duty.*

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## APPENDIX VII—(*see paragraph 37.*)

### Description of bleaching at Dacca.

Muslins are steeped in water, other cloths are first washed. They are then steeped for some hours in a mixture of soap and Fuller's earth. They are then half dried and steamed. For the latter process the cloths are twisted into loose bundles and arranged in circular layers around a bamboo tube connected with a boiler. The steam is then diffused through all the cloths for a whole night. They are then again steeped in the mixture of soap and Fuller's earth, and again steamed. This process, which is the same as the English bucking and crofting, is continued for ten or twelve days. Finally, the cloths are steeped in clean water mixed with lime-juice. The water at Dacca is said to be of excellent purity, and hence the fine quality of bleaching is obtained. The advantages of the Dacca system of bleaching is that no acids or corrosive chemicals are used. Bright sunshine is a great assistance.

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## APPENDIX VIII—(*see paragraph 69.*)

### Notes on establishment of Technical Schools in connection with the Calcutta Municipal workshops.

No. 4489, dated the 13th December 1889.

From—John Cowie, Esq., Secretary to the Corporation of Calcutta,

To—E. W. Collin, Esq., C. S., on Special Duty, Bengal Secretariat.

I am directed by the Chairman to acknowledge the receipt of your letter No. 22, dated 2nd September last, enquiring whether the Municipality would be willing to establish a technical school for practical training of boys in blacksmith's work, carpentry, joinery, etc., to be attached to the Municipal Workshops.

2. In reply, I am directed to forward copy of a report by the Engineer to the Corporation on the subject, which was laid before the General Committee of the Commissioners at their meeting held on the 7th instant for consideration; after discussing the matter, the Committee came to the conclusion that under all the circumstances as set forth by the Engineer the Municipal Workshops at Entally cannot conveniently be utilised for the purposes of a technical school.

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Dated 22nd November 1889.

From—James Kimber, Esq., mem., inst. c.e., Engineer to the Corporation of Calcutta,

To—The Chairman of the Corporation of Calcutta.

With reference to the proceeding of the General Committee at a meeting held on the 14th ultimo asking for my opinion regarding the proposal "to establish technical schools for practical training in connection with the Municipal Workshops," I beg to submit the following remarks, and in doing so to attach a note sent me by Mr. Müller, the Superintendent of the Municipal Workshops, on the subject. I have attentively read Mr. Collin's letter, dated 2nd ultimo, to the Chairman's address.

2. We have always had apprentices, numbering 6 to 9, in the Municipal Workshops, and so far they have served as a technical training school. We have not room for a greater number of apprentices. Any respectable lad who can read and write is engaged on application should there be a vacancy; he serves for six months without pay, and from that period gets small wages according to his aptitude and usefulness. The apprentices are not bound in any way and many leave for bettering their prospects (not necessarily in the same line of business, or whenever it may suit them). Only a very small proportion of lads become experienced mechanics with us, as the sphere of our operations is small and higher class of work is to be found elsewhere. The lads get no training from us outside the workshops, and notwithstanding a praiseworthy attempt of Mr. Müller to teach them drawing out of hours without charge, not one availed himself of the offer.

3. The training which the lads can obtain in the Municipal Workshops comprises blacksmith and boiler work, carpentry and joinery, founding and pattern-making, the use of machine-tools and some fitting, but the same lad does not necessarily go through all these departments.

4. It would be an advantage to these lads no doubt if they could have some training in such subjects as geometrical and mechanical drawing out of workshops, but from Mr. Möller's experiment, they do not seem to desire such a means of improvement. Whether, if the time for such subjects were taken out of their workshop hours, they would take more kindly to the classes I cannot say. Their services would not, however, in such case be of the same money value to the Municipality ; in other words, more technical training than is now given could not obtain without further expenditure, which expenditure would not be fairly chargeable to the workshops which are conducted on commercial principles. In my opinion a technical school could not be attached to the Municipal Workshops without a very considerable outlay both in capital and current charges, and no equivalent benefit would result to the workshops, for the lads or the great majority of them would go as soon as qualified to other workshops where they would find more of the higher classes of work. A school where the number of lads would be limited to nine only, the number we can find room for in the workshops, does not look practical.

The foregoing remarks do not refer at all to ordinary mistries or workmen who manage to bring up their young to their own callings without any obtrusiveness or trouble about apprenticeships. It would be of no use offering anything in the way of lectures or improvement classes to the ordinary mistry.

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NOTE BY THE SUPERINTENDENT ON PROPOSITION TO ESTABLISH TECHNICAL SCHOOLS.

*Advantages to workmen.*—It would be a great advantage, both to employer and employee, if the native workmen of all kinds, and especially the mistries, had some knowledge of drawing, at least, sufficient to enable them to understand what was required from a rough sketch. In this shop, where over 400 men are employed, there is not a single native mistry or workmen who can form from a sketch anything like a correct idea of what is wanted. Carpenters, black-smiths, boiler-makers, fitters, turners, tin-smiths, all would benefit as well as the foreman or manager who has to direct them and the proprietor who pays them. Less time would be lost in explaining, and material and labour would be saved by the fewer mistakes made. To counterbalance this probably the men would want more pay, and they could as certainly obtain it.

*Indispensable for apprentices.*—As regards apprentices who are being trained and who are in the future expected to guide and direct workmen, to them a practical knowledge of mechanical drawing is indispensable.

I presume that in this scheme practical instruction in all branches of work, and not merely drawing, is intended—I mean instruction by lectures and practical experiments in mechanics, the lever, wedge, gears, etc., as to the various qualities of metals, stone, timber, etc., their relative strength and uses, the most advantageous way of manipulating them, joints of all kinds, with practical demonstrations of those best adapted in different circumstances.

The melting of metals and composition of alloys, etc., etc.

*His own attempt to raise a drawing class among the apprentices.*—I relate my own experience here with regard to instruction in mechanical drawing. I offered to teach the apprentices after work hours free of all charge, one hour a day, twice a week, provided they would each bring a pair of dividers, Bowpencil, small parallel rule and pencil, and I told them where such could be got of a useful quality and at a very moderate price. Not a single one responded, or would put himself to the slight expense and trouble involved in this arrangement. I put before them the absolute necessity of having a knowledge of drawing if they wished to be anything beyond fitters or drivers. It is true that they are all very poor, but not so poor, but that with a little energy and self-sacrifice they might have availed themselves of the offer. I find generally a want of interest and an indisposition to learn.

They perform in a way the task given them, but do not care about going beyond it and have no spirit of enquiry.

Two of the most promising boys I have had have left before completing their time and become shop-boys for the sake of a few rupees more pay to spend (I fear) in most cases on their own pleasures.

*Workmen at present are unpromising materials.*—To attempt to teach the class of men we have here, supposing that they could be induced to attend at all out of working hours, would be labour lost. They have no groundwork of education on which to base such instruction, and to make them understand would be an almost hopeless task.

The Government started a mechanical drawing school some ten years ago. It was located for a time in Fairlie Place. The attendance was poor and irregular from the commencement though entirely free, and was eventually discontinued.

If those lads who now go in for higher education would instead accept practical training and join any such technical schools as the Government may establish, there might be some hope of success in the future.

I give a short history of some of the lads who have been apprentices here.

Two lads, E. N. and P. B., who served five years here, are now working in the Eastern Bengal State Railway,—one as a wagon examiner and the other as guard.

Two others, E. G and C. E., served their time and went to sea in the engine-room. They have since I hear both left their trade.

One G. F., a smart lad, who had mastered carpentering, left to join a drapery warehouse. Others are working as roller drivers and steersman in this and other Municipalities. The usual course with apprentices is for them to work in each shop until they are able to turn out a decent

piece of work. The shops are foundry, carpenters, blacksmiths, fitting, turning, boilermaking. In some instances where a lad seems to have a special aptitude for any one particular branch, he is retained there for a longer period, so as to thoroughly master it, for instance, there is one lad in the foundry who has turned out a smart sand-moulder, and is now being put through a course of instruction in the management of the cupola, and subsequently will be taught the ventilation of moulds and cores, loam moulding, coredrying, etc., with a view of his making this speciality. He will, of course, be put for some time in the other shops, especially in the pattern-making, but the time spent by him in these other places will be comparatively short. If this lad now had the opportunity of acquiring information by lectures and the aid of books, whereby he could master the scientific and theoretical part of his trade, it would, of course, render him so much more useful.

Say a boy in the fitting shop learns to put together the parts of an engine and even to set the slides, but he knows nothing of lead or lap, of cut off and expansion, of the quantity of coal he ought to use, the water evaporated, latent and specific heat, nominal and indicated H. P., etc. Books are expensive and beyond his means. There are no night lectures or schools where he can get information free of charge.

Lads in places like John King & Co. or Burn & Co. have much better opportunities of learning the construction and erection of engines than here. As regards carpentering, founding, turning and fitting, they can do as well here as elsewhere.

A technical school should be central, or *better still*, arrangements made for branches in the various workshops, with lectures on certain fixed days, and at times that would not interfere with current work.

If a special room was set aside for this purpose in each factory, and books, instruments and instruction provided *free of cost*, I think a successful result might be looked for.

*5th November 1889.* H. A. MÜLLER.

## *No. 18(a).—Resolution on Mr. Collin's Report.*

No. 361-T—G., dated the 9th October 1891.

From—C. E. BUCKLAND, Esq., Offg. Secretary to the Government of Bengal, General Department,

To—The Secretary to the Government of India, Home Department.

I am directed to acknowledge the receipt of your letter No. 231, dated the 22nd September 1891, requesting that the Government of India may be furnished with a copy of the orders of the Lieutenant-Governor on the report, dated the 4th January 1890, submitted by Mr. E. W. Collin, C.S., on the existing arts and industries in Bengal.

2. In reply, I am to forward herewith a copy of the proceedings of the General Department of this Government for the month of September 1891, Nos. 1—17, from which it will be observed that final orders have not yet been passed on many of the points referred to in Mr. Collin's report, but that the following orders have, as a preliminary measure, been issued, having for their object the encouragement of drawing, on which so much depends in all arts and industries:—

(1) that drawing and allied subjects should be generally introduced in secondary schools, high and middle, but not in primary schools; and

(2) that drawing should be made a compulsory part of the course in training schools, sanction being at the same time accorded to a sum not exceeding R6,000 per annum for teaching drawing in the eight normal schools of the first grade.

3. Of the remaining proposals, the following are now under consideration:—

(*a*) The establishment of special classes and of a special lecturer at the Seebpore College for the training of mining assistants, referred to in paragraph 63 of Mr. Collin's report. The Lieutenant-Governor does not think that a mining school should be started without being sure of the demand for apprentices in coal-mines, and he therefore proposes to ascertain in the first place from the different Coal Companies whether, on the starting of a mining school at the expense of Government, they would undertake to employ one or more apprentices annually, who may have obtained certificates from the mining school, and if so, on what terms. But before taking any action to this effect, His Honour desires that a scheme of instruction to be imparted in the proposed school should be prepared and considered, and the Director of Public Instruction has been requested to draw up such a scheme. It has been ascertained that Sir Alfred Croft is in communication with the Faculty of Engineering of the University of Calcutta on the subject.

(*b*) The Training of mechanical engineers by the introduction of apprentices into the workshops connected with State railways, etc., referred to in paragraphs 65 and 66 of the report. It is proposed that a boarding-house for the training of apprentices in mechanical engineering should be established at Kanchrapara in connection with the workshops of the Eastern Bengal State Railway, and information is being collected as to the system pursued in the East Indian and Burma Railways.

(*c*) The improvements in cotton weaving, referred to in paragraph 81 of the report. It has been suggested that a school should be established at Berhampore, under the District Board, in which improved processes and designs for weaving silk and cotton should be taught. Mr. Nitya Gopal Mookerjee, Deputy Collector on special duty in connection with sericulture at Berhampore, has been directed to prepare a scheme for the establishment of the proposed school, and submit it to Mr. Finucane, Director of Land Records and Agriculture, on his return from privilege leave.

4. Anxious as the Lieutenant-Governor is to do all in his power to stimulate arts and industries in Bengal, it appears to him that the subject of Mr. Collin's report is hardly one which admits of being treated as a whole. This Government is doing what it can to advance technical education where opportunity offers; but it is not a matter which can be pressed regardless of the demand or of economy. It is believed that the Government of India are aware that technical education, so far as regards the mechanical and manufacturing industries, is for the most part concentrated at the Seebpore Engineering College, on which considerable expenditure is annually incurred. Not only is the Seebpore College a place of education in which artisans are trained to a high degree of skill in those general processes which are employed in large manufactories of whatever kind, but the Lieutenant-Governor looks forward to a time when it will take up various branches of special industry, and by imparting to students some knowledge of the special principles and mechanical processes that underlie each, develope and assist such industries in many useful ways. Further, the Seebpore College, when it has attained to its true position as the centre of industrial education in Bengal, may be expected to prove of the greatest service to local technical schools, on the one hand by supplying them with trained teachers, and on the other by receiving the most promising pupils of such schools and carrying them on to a further course of advanced instruction.

**No. 18 (b). Country-made Guns.**

5. The School of Art in Calcutta occupies, and may be expected to occupy, a precisely similar position with regard to the extensive field of artistic and decorative industry, of which only a small corner has yet been cultivated in Bengal, but the future development of which is practically unlimited. In connexion with the subject, it is unnecessary to do more than refer to the arts of drawing and painting, the primary subjects of instruction in a school of this kind. But it may be observed that pupils from the engineering and mechanical drawing classes already find employment in railway offices and in the Public Works Department, and that opportunities for similar employment will probably be more abundant hereafter. Again, drawing is now recognised as the first essential of technical instruction; and it may be confidently expected that students will, in no long time, flock to the elementary classes in free-hand and model drawing in much greater numbers than at present. But it is more important to refer to those artistic industries, outside the range of simple drawing, that are actually practised in the School of Art. It has for a long time taught lithography and wood-engraving with great and acknowledged success. Metal-chasing and wood-carving have been taken up and again abandoned; but there is no reason to doubt that a demand will again arise for training in these useful and lucrative arts. Modelling has always been practised in the school, and in the last few years it has received a new development in the attention that has been paid, under Mr. Jobbins' careful superintendence, to the production of life-size figures of typical Indian races. Pottery, tile-making, and other branches of the fictile art, have yet to be taken up. Then, as manufactures progress, and manufacturers in India begin to pay attention to the use and value of ornament in their products, the necessity for a School of Design will be felt and the School of Art will thus take another large development. As already stated in paragraph 3, the establishment of school at Moorshedabad for silk and cotton-weaving has been suggested, and if set up, it will look to the School of Art for its designs. Indeed, wherever drawing classes or technical schools are set up throughout Bengal, they will, on the one hand, have to depend on the School of Art for their teachers of drawing, and on the other, they should be encouraged to send to the school, for further training, such pupils as manifest artistic promise. It is not too much to hope that, if duly supported and encouraged, the School of Art may do for Bengal all that South Kensington has done and is doing for industries, both manufacturing and artistic, in England. This, however, is a process not to be completed in a day, but one requiring gradual development through a long series of years. Sir Charles Elliott is anxious to give all necessary support to the School of Art, and to promote its development in all possible ways; but the fruits of such a policy must be looked for in the next generation rather than in this. He has made it known that he will encourage the establishment, by District Boards and through other agencies, of local schools of technical instruction, wherever an effective demand for them may arise; but it is to the maintenance of the Calcutta School of Art, and of the Seebpore Engineering College, on the highest possible scale of efficiency, and to their future development on various, if as yet unforeseen lines, that the Lieutenant-Governor is chiefly inclined to look for the promotion of technical education.

## *No. 18(b).—Testing country-made Guns.*

No. 3157 R., dated the 27th March 1890.

Memorandum by—C. C. Quinn, Esq., Officiating Commissioner of the Bhagulpore Division.

Copy submitted to the Government of Bengal, General Department, with reference to their letter No. 174 of the 4th instant. I am not in favour of the proposal to test the barrels of Monghyr-made guns in the absence of any evidence of accidents from the bursting of these guns, or of any application on the part of the manufacturer. The proposal that provision should be made for the registration of trade marks is, I think, a good one.

No. 1863 R., dated the 24th March 1890.

From—T. E. Coxhead, Esq., C.S., Officiating Collector of Monghyr,

To—The Commissioner of the Bhagulpore Division.

In reply to your No. 3027 R., of the 13th current, relating to Mr. Collin's suggestion for the testing of Monghyr-made guns and the registration of the makers' trade marks, I have the honour to say that I do not approve of the proposal.

No. 18 (c).
Dairy Work,
Bengal,
1890.

2. No facts are given by Mr. Collin to show that the guns manufactured are dangerous to life or that there has been any accident in using them.

3. Naturally a man who makes a dear gun objects to the competition of men who make cheaper ones, and this principle will account for the representations made to Mr. Collin by the so-called "old firms."

4. I think that the operation of Mr. Collin's proposal would tend to the vexatious, oppressive and extortionate treatment of a number of industrious artificers, and that no benefit would result from it whatever.

5. I beg to return the report.

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## *No. 18 (c).—Note on Dairy Work.*

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No. 1773 Agri., dated 11th August 1890.

From—M. Finucane, Esq., C. S., Director of the Department of Land Records and Agriculture, Bengal,
To—The Secretary to the Government of Bengal, General Department.

With reference to your letter No. 173, dated the 4th March 1890, I have the honour to submit copies of notes by Mr. Basu on the subject of experiments made with milk separator. The superiority of the separator to the native process of preparing butter and *ghee* is not so well established as to justify the establishment of dairy farms at Government expense in Purneah. Further experiments will, however, be made in the cold weather, and the separator will be exhibited at *melas* held at Kissengunge in the Purneah district in January and at a *mela* held at Caragola in February. If the separators are found to find favour with the people at the fairs, the question of establishing dairy farms, or of encouraging the establishment of them by private individuals, can then be taken into consideration.

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### THE INDIAN DAIRY COMMISSION.

The Sandringham Dairy Supply Company, Limited, of London, have sent over the Commission to India with the object of popularizing in this country the improved method of butter-making which has followed on the remarkable invention originally made by Dr. DeLaval of centrifugal separators. The Sandringham Dairy Supply Company are the sole agents of DeLaval's separator in England. The Commission is composed of Mr. H. A. Howman, an experienced dairy farmer, and Mr. Keventer, a Swedish dairyman. After visiting the Bombay and Madras Presidencies, the Commission arrived at Calcutta on the 17th of January.

The spacious premises of the Agri-Horticultural Society of India, Metcalfe Hall, were placed at their disposal by Mr. Blechynden, Secretary to the Society. Mr. Howman had here on view a full and interesting collection of dairy machines and utensils. Among these, the two separators—the "Baby" and the "Windsor"—and the Victoria churn, attracted special notice.

As the principles which underlie the separation of cream by centrifugal force are not generally known in this country, the following description of the "Baby" and the "Windsor" may not be out of place. The principal part of the "Baby" separator is the cylinder made of the best Swedish steel, placed inside an iron-frame. This cylinder is spun like a top at the rate of 6,000 revolutions per minute by 40 revolutions of the handle, this high speed being attained through the medium of a system of axles and toothed wheels. The milk which flows into the cylinder from a can placed above it is thus made to revolve at an enormous speed, and is at once separated into cream and skim milk in accordance with the law of dynamics that bodies revolving in a circle fly, or, if restrained, tend to fly away from the centre; and that of two bodies thus revolving, the heavier flies further from the centre than the lighter. Thus, if we put a number of leaden and wooden balls into a cup, and give a rotating motion to the latter, the leaden balls will stick close to the inside of the cup, and the wooden ones will collect on the inside of the leaden balls. Now of skim milk and cream which are the two component parts into which milk naturally separates, the former is considerably heavier than the latter, their specific gravities being respectively 1·06 and as compared with water. Thus, when milk is made to revolve rapidly, the skim milk being heavier flies further from the centre than the cream, and as both are restrained by the sides of the cylinder, they form two distinct layers inside the cylinder, one within the other. The milk being thus separated, the skim milk, which forms the outside layer, is pushed up a narrow tube opening on the inner circumference of the cylinder, into a tin-ring fitted into the top of the cylinder, and from this ring through a spout into a bucket below, and the cream which forms the inner escapes through a notch at the top of the cylinder into a second tin-ring, and from this through a spout into the cream bucket. The flow of the milk into the cylinder is regulated by a float which is placed in a circular tin-dish which intervenes between the milk and the cylinder.

The "Windsor" is in principle the same as the "Baby," from which it differs only in one or two details. These are (1) that the revolving cylinder in the "Windsor" is horizontally placed while in the "Baby" it is vertical, and (2) that the high speed of the cylinder in the "Windsor" is communicated by the handle through two friction rollers on which the axle of the cylinder rests.

All the modern cream separators are based on the principle of separation by means of centrifugal force, as described above. They may be of any desired capacity. The larger ones have to be driven by steam-power and can separate as many as 150 gallons of milk per hour while the "Baby" has a capacity of 12 gallons and the "Windsor" 35 gallons per hour.

The Victoria churn shown is an end over end churn, and, unlike most churns, has no beaters inside. The absence of beaters inside is said to be an advantage, as it allows the churn to be easily

washed and cleaned. It may be remarked here that in all dairy operations, cleanliness of utensils is a matter of the utmost importance.

Mr. Howman gave a series of demonstrations at the Metcalfe Hall. The chief among these are briefly described in the following paragraphs:—

(1) The first demonstration was intended to be a competitive trial between the English method of butter-making and the native. For this purpose a native dairy man then carrying on a large milk trade at Kidderpore was induced to enter the field with Mr. Howman. The proceedings opened by making over 136½ lbs. of milk of the same quality to each of the two parties. Mr. R. Blechynden, Secretary to the Agri-Horticultural Society of India, Mr. Irving of the firm of Messrs. T. E. Thompson and Company of Calcutta, and Mr. B. C. Basu, Assistant to the Director of Agriculture, Bengal, superintended the proceedings. Mr. Howman passed his portion of the milk through the "Windsor" separator, and the cream was put aside in a safe place to make it "ripen" and get ready for churning butter on the next day. The native dairyman heated his milk and set it to curdle into *dahi* in earthen pots which were also put aside for the night. On the next day at 12'oclock several other gentlemen, among whom were Mr. Finucane, Director of Agriculture, Bengal, Dr. Greenhill, Mr. Tremearne, Managing Director of the Great Eastern Hotel, and the superintendent of the Sailors' Home, came to see the competitive trial. Mr. Keventes placed the cream made on the previous evening into the Victoria churn, and in less than half an hour the churning was complete, and the butter pressed and made. Against the four *goalas* were put to work to churn the *dahi* and get out the butter in the native way. Although no attempt was made to arrive at a comparative idea of the time occupied by each process, the gentlemen who watched the proceedings came to be of opinion that the mere process of butter-making as followed by native dairyman would take full thrice the time as the English process of butter-making from cream. The native dairymen present at the trial seemed to be much interested in the new method and were compelled to own that, apart from other advantages, the English method of butter-making had a decided advantage over their own in respect of the saving of labour. On weighing the two lots of butter, the superiority of the English method became at once apparent, its outturn being 6 lbs. 6 oz., against 4 lbs. 13 oz. by the native method. The native butter also looked thinner and appeared to contain a larger percentage of water in it than the machine-turned butter. To ascertain this point it was proposed to carry the trial further by converting the butter from either process into *ghee*, but during the boiling an accident occurred which put an end to the proceedings so far as the native butter was concerned. The butter from the machine gave 4 lbs. 4 oz. of *ghee* (67 per cent. on the butter), and a residue of only 1 oz. 12 drs. of curd and skimmings.

As regards the quality of the two lots of butter, Mr. Howman claimed superiority for his own, but on this point the gentlemen present were not unanimous to give any decided opinion.

(2) The second demonstration was with buffalo milk. It was also intended to be a competitive trial, but the cream which Mr. Howman separated was not kept for butter-making but distributed in small quantities to several European gentlemen, all of whom pronounced the cream to be of very good quality. The native dairyman made butter out of his lot of buffalo milk and obtained 1½ lbs. of butter from 22½ lbs. of milk, which is 1 lb. of butter to 15 lbs. of milk. This shows the very rich quality of buffalo's milk as compared with the cow's.

The great heat of the Indian plains does not permit the making of cream by the ordinary method of setting the milk in pans; hence this delicious article of food is not at present available in the Indian market. The possibility of obtaining cream from new milk by means of the centrifugal separators has been now proved, and it is hoped that before long the European public of Calcutta will have no cause to grudge the absence of this article of luxury from their table.

(3) Several more trials were made to show the working of the separators. In one case 85 lbs. of milk were separated by the "Windsor" in 18 minutes, and the cream when ripe was churned by the "Victoria" and gave 5 lbs. 4 drs. of butter (1 lb. of butter to 17 lbs. of milk); in another 5 lbs. of cow's milk was separated by the "Baby" in seven minutes, and the cream was immediately churned into butter. The quantity turned out was 4¼ oz. (1 to 30⅓). The diminished yield was partly attributed to the fact of the cream being churned while yet fresh. To get the maximum quantity of butter, the cream should be ripened, *i.e.*, soured by keeping, sometimes a proportion of butter milk is added to sour the cream.

(4) *Cheese-making.*—As an all-round dairy animal, Mr. Howman considers the buffalo as superior to any kind of cow—European or native. The experiments which he conducted in Bombay and Madras have led him to entertain this view. From these he found that buffaloes' milk contains almost twice as much solids as the average of cows' milk, the increase being mainly in fats and casein. Native experience fully confirms this view. The bulk of the ghee and butter in the Bengal market is made from buffalo's milk, and the Dacca cheese, which is made in the Megna islands, is said to be entirely made from it. Mr. Howman thinks that besides home consumption, buffalo-milk cheese may be largely made for export. The Italian cheese, Gorgonzola, is said to be made from buffalo-milk, and there is no reason why it should not be made in India. To demonstrate the feasibility of cheese-making in Benah, Mr. Howman took a small quantity of whole buffalo's milk and had it made into cheese. The milk was set with rennet and the curd pressed in a press which was improvised by perforating the bottom of a small circular tin box into which the curd was placed and pressed down by weights. It remains now to be seen how the cheese, so far well made, ripens by keeping in the climate of Bengal.

(5) Mr. Howman was possessed of an idea that probably ghee might be made directly from cream, thus avoiding all the labour and expense of converting the cream into butter as an intermediate product. To test this point, a small quantity of cream (about 8 oz.) was put into a melting pot over a slow fire, and kept boiling for about half an hour, when the curd separated itself from the ghee, which was then strained through a piece of muslin. The quantity and quality of the ghee thus made were creditable; but the length of time and the quantity of fuel which was necessary to convert the cream into ghee, as well as the labour and trouble involved in constant

stirring of the liquid to prevent it from burning against the sides of the melting pot, appear to preclude the possibility of profitably making ghee directly from cream.

The above were the most important of the numerous demonstrations Mr. Howman gave at the Metcalfe Hall. The working of the separators and the churn was continued to be shown every afternoon to the public up to the 2nd February, when Mr. Keventer, the Dairy Assistant, left for the Khoolna Agricultural Exhibition. Mr. Keventer worked here for two days; and although the quality of butter he made was pronounced to be very good, the proportion of milk to butter turned out by his machines was very low and created an unfavourable impression in the minds of the spectators as to the efficacy of the machines. Of the three butter experiments he made, the most successful one gave 1 lb. of butter to 32 lbs. of milk, the proportion usually accepted being 1 : 16. In this connection I may mention that Mr. Keventer pronounced a sample of native-made butter he saw at the Khoolna Exhibition to be the best he had seen in India and quite as good to look at as any European butter. The people present at the Exhibition did not however, consider the sample as the best of its kind.

On the 8th February Mr. Howman left for Patna, where he hopes to hold some airy demonstrations.

Submitted to Director for perusal and orders.

B. C. Basu,—19-2-90.

To Director—

Mr. Howman's experiments in Calcutta, Nariad, and Khoolna have made it clear that the method of separating cream, and of making butter by improved English machines, would pay well in large towns like Calcutta having a wealthy European population, who would always gladly pay high prices for genuine and good dairy produce. As regards the outturn of butter and ghee Mr. Howman's experiments have been far from conclusive. In Calcutta the machines turned out a larger quantity of butter than the native process; but at Khoolna, Bankipore, and also at Nariad, Mr. Howman's experiments were absolute failures from the point of view of quantity. I believe longer experience of the working of the cream-separators is wanted to enable the extraction of the full quantity of fat out of milk.

It is certain that, however well made and superior in quality the machine-made butter may be, the cream-separators and English churns will never come into general use until the *goala* are satisfied in respect of quantity as well as of quality of the outturn.

I believe dairy demonstrations as proposed by Mr. Ozanne will prove useful in Calcutta where a large demand for good butter already exists, and where the skimmed milk may be readily disposed of. We have recently received a creaming separator, churn, and other dairy utensils from England through Messrs. T. E. Thompson and Company. These may be used for the purpose of dairy demonstrations. But the machines must be worked and studied for sometime before they can be shown by us to the public. Yesterday I called on Mr. Blechynden to ask his opinion of the possible value of dairy demonstrations. He said that the Great Eastern Hotel Company have already started a dairy farm near Calcutta, where they are making butter for their own use by means of the machines. Mr. Blechynden thinks that more demonstrations of the machines given at Government expense by officers who share neither in the profit nor in the loss that may accrue to Government from the dairy farm are not likely to produce any useful result. He recommends that the dairy machines and utensils, which we have recently received from England, may be made over to some one who will undertake to work them at his own expense, and will naturally try his best to turn out a profit.

If he finds the business profitable, he will soon buy all the requisites himself. Mr. Blechynden's recommendation, with which I quite agree, is very practical. If Government were to start a dairy demonstration farm at its own expense, it would be very expensive, as it would involve the purchase of cows, the building of sheds, and the maintenance of a Superintendent. All expense, on the other hand, may be avoided by following Mr. Blechynden's plan. If the Director has no objection, I may take up the work myself at my own expense. All that I would want from Government are the free use of the machines for a prescribed period, and some advance (for which I shall hold myself responsible). I shall entertain a competent staff of servants to manage the work for me, as I am naturally debarred from supervising the dairy myself, being a Government officer.

If the Director do not approve of my undertaking the work, I shall try to secure the services of some other private individual for the purpose.

Independently of the dairy demonstrations, the problem remains to be solved whether the cream-separator and churn can turn out the same quantity of butter and ghee as the native process. I propose, with the Director's permission, to make some experiments with our machines to test this point.

B. C. Basu,—16-4-90.

I should like to have further details. Where do you propose to work, with what establishment, and at what cost? Can anything be done in Purneah and Dacca, as suggested in paragraph 5 of the report.

M. F.,—17-4-90.

To Director—

Since receiving your order of the 17th April, I have made several experiments with the centrifugal cream-separator and English churn which we have recently received from England through Messrs. T. E. Thompson and Company. It is very difficult—almost impossible—to get genuine milk in Calcutta. The milk is almost invariably mixed with more or less water,

and often the cream is taken out by boiling before the milk is brought to the market. Owing to this cause in some of my experiments, the proportion of butter obtained from milk was very low. In two of the experiments I succeeded in securing genuine unadulterated milk; and obtained 1 seer and 14 chittacks of butter, respectively, from 20 seers of milk. Considering that the yield of butter is naturally lower in the hot weather than in the winter, the proportions were in my opinion satisfactory. On the 5th and 6th instant, Mr. Banerjee and myself made a comparative trial between the English method of butter-making and the native, and also between the Bengali and Uriya churns. For this purpose 20 seers of milk were separated by means of the cream separator and the cream (which measured $2\frac{3}{4}$ seers) was churned after having been kept for nearly six hours. At the first churning, the outturn of butter was 11 chittacks; the butter-milk was put back again into the churns, and churned; at this churning another three chittacks of butter was obtained. At the third churning two chittacks more were obtained, thus making the total outturn exactly one seer. It should be mentioned here that the quality of the butter from the second churning was much inferior to what was obtained from the first and so the third was inferior to the second. It was not considered worth while to continue the churning any further, as the quality of the third butter was so bad that it could not be used excepting for purposes of cooking, etc. I may incidentally mention here that the failure of Mr. Howman's experiments at Khoolna and Nariad was evidently due to the mistake he made in churning the cream only once, for my repeated trials have shown that a large proportion of butter is left in the butter-milk after the first churning. This fact may be due to some peculiarity of the Indian milk. In India the *goalas* continue to churn the *dahi* and gather the butter by instalments until the butter-milk or *máthá* is fairly exhausted.

To turn to the comparative trial—the Bengali and the Uriya churns which differ only in respect of the shape and material of the churning rod—the one being a four-forked bamboo and the other made of a small circular block of *nim* wood fixed to the end of a rod, yielded the same outturn. Twenty seers of milk had been set to *dahi* in the previous evening, and in the morning were divided equally between the two churns, one of which was worked by a Bengali *goala* and the other by an Uriya *goala*. The outturn in each case was $6\frac{1}{2}$ chittacks of butter, or 13 chittacks for the 20 seers of milk. Thus, the English system, which was worked by me yielded three chittacks more of butter than the native; at the same time the quality of the English-made butter was in our opinion superior to the native. The effectiveness of the English machines does not therefore admit of any doubt.

I propose to send the English cream separator and churn for exhibition at a large *mela* which is shortly to come off at Khalishakhali, a village in Khoolna. The country about there produces a large quantity of butter for export to Calcutta, and there are many rich *goalas* in the neighbourhood. At the same time, the Seebpore plough and several other improved implements will be sent there for show. One of the overseers will take all these implements and machines and show them at work to the visitors.

> I am afraid an overseer cannot be trusted to see the machine is properly worked. Mr. Basu should go there himself, or Mr. Banerjee might go if Mr. Basu cannot.
>
> M. F.

I have not been able to gather any information regarding the pasture grounds in Purneah and Dacca, mentioned by Mr. Collin in his report. But I am making enquiries about them from persons who have been to those parts. I believe there is great field for the English dairy machines in Bengal.

> Report the results. Mr. Basu might write to Mr. Collin who is now in Purneah on the subject.
>
> M. F.

You will kindly excuse me for abandoning the idea of starting a dairy myself. I had an idea that a dairy could be established near Calcutta, but the price of milk in the neighbouring country is prohibitive. To start a dairy far away from Calcutta is out of the question for me. From enquiries which I have made, it appears that Dinapore and Bankipore are suitable places for the establishment of a dairy; milk is very cheap there—about 20 to 25 seers for the rupee—while the railway is a great advantage in the way of cheap transit of the dairy produce.

> Perhaps Mr. Basu may be willing to try the machines at his dairy firm.
>
> M. F.

B. C. Basu,—9-5-90.

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## *No. 18 (d).—Note by Sir A. Croft on some points raised in Mr. Collin's report.*

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No. 6511, dated Calcutta, the 24th November 1890.

From—Sir A. Croft, K.C.I.E., Director of Public Instruction, Bengal,

To—The Secretary to the Government of Bengal, General Department.

In reference to your No. 171, dated the 4th March 1890, and subsequent reminders, asking for information and opinion on certain points raised in Mr. E. W. Collin's Report on the arts and industries of Bengal, I have the honour to submit the following observations.

2. With regard to paragraph 56 of the report, I am desired to submit any information that I may possess as to the extent to which the artizan class has received elementary instruction. I regret to say that on that point I have been unable to obtain any very precise information. I have ascertained that the forthcoming census will include (*a*) a classification of the people by occupations,

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(*b*) a distribution of them by age, two of the classes being from 0 to 15 years and from 15 to 45 years; (*c*) a division of the people into literate and illiterate. It is possible that if instructions to that effect are given him, the Superintendent of Census Operations for Bengal may be able to combine these three classifications, and to show how many adult artizans can read and write, and how many artizan children are at school. Meanwhile the following figures may be useful. From returns collected in the year 1886-87, I find that 50,514 pupils, out of a total in all schools of 1,359,644, were the children of skilled artizans in receipt of a yearly income of R200 and under.* This gives a proportion of 3·7 per cent. for pupils of this class, while Mr. Collin states that their proportion in the population is about 8¾ per cent., or, say, six millions, of whom three millions would be males. At the usual proportion of 15 per cent., there would be about 450.000 boys of school-going age belonging to the artizan class; and thus it appears that about 1 in 9 of them are at school, the proportion for the whole of Bengal being rather better than one in four. There seems, therefore, to be a very fair proportion of the children of artizans at schools; and at any rate there should be abundant room and material, among the 50,000 children actually at school, for the development (if school education has that effect) of a much higher degree of technical skill than the class is believed to possess. But unless artizan children of an earlier generation went to school in smaller numbers than their successors, it would follow that general education has by itself little or no effect in enhancing the technical skill of artizans, for which object improved technical training seems to be essential.

* Excluding girls' schools, schools of special instruction, and private institutions, the pupils are thus distributed :—

| | |
|---|---|
| In high schools . . . | 897 |
| In middle " . . . | 3,524 |
| In upper primary schools . | 4,425 |
| In lower primary " . | 39,171 |

3. In paragraph 67 is discussed the long-standing question of the establishment of industrial schools in various localities. I have found it very difficult to offer any new suggestions upon that point, in the uncertainty that has until lately surrounded the future of the Seebpore Workshops, with which in my opinion the question of local industrial schools is intimately connected. But now that it has been settled, as I understand, that the educational purpose of these shops is to be fully recognised and affirmed, the position becomes much more clear. In writing upon this subject, I have frequently urged that the Seebpore Workshops should be the source from which European hand and machine tools should be regularly supplied to local industrial schools, chiefly by the labour of the apprentices and their instructors. The tools so furnished would not be equal in quality to those supplied by English manufactures; but Mr. Toogood, Superintendent of the Seebpore Workshops, informs me that they would serve all the purposes of local technical schools. Their manufacture being recognised as part of the higher course of training for Seebpore apprentices, they could be supplied at a cost which would put them within the reach of nearly every place that had sufficient enterprise to set up an industrial school. Indeed, I would recommend that help should be freely afforded by Government in such cases, in the shape of a grant of tools to facilitate the opening of schools started by local enterprise. It is also worth consideration that the apprentices at Seebpore are likely to enter with keen interest into the manufacture of machines and tools for local industrial schools, since the establishment of such schools and workshops will afford, I hope, frequent opportunities for the employment of some of their number as Superintendents, the theoretical and manual course at Seebpore supplying the precise qualifications that are needed for such a post.

4. Mr. Collin's object in proposing the establishment of special industrial schools to supplement the workshops that already exist for independent purposes of manufacture is expressed in the following sentence:—"Special trades would not be taught, but the course would include all sorts of manual work in wood and metal, and the theoretical course would teach the principles which underlay such industries." This is in precise conformity with the views I have long held as to the general plan on which local industrial schools should be started. The particular trades of the carpenter or the blacksmith, if they are to be taught by artizans even by exceptionally selected artizans, of the ordinary indigenous type, and if they are not to go beyond the processes of the bazar, nor to use any tools but those of the bazar,—such trades are far better taught under the indigenous system of apprenticeship than they ever can be in a school. What we should aim at in an industrial school is to train boys to the use of improved tools and better methods of work than they will find outside. Men so trained will be able to turn out better finished, and therefore more valuable products; and there is no danger that after leaving the school they will fall back, if they can possibly help it, upon the inferior implements and processes of the bazar workman. If they cannot themselves find the necessary capital for the improved tools, they will take service with those who can. When I speak of improved tools, I refer not only to hand but to machine tools. There is a large number of hand tools which country workmen never use; and it is the employment of these which gives the superior finish that we find in the work of European workmen and of artizans who have come under European training, such as Chinese carpenters and the men employed by such firms as Messrs. Burn & Co. or Messrs. Lazarus & Co. A good workman of this stamp can earn so much more than a bazar carpenter or blacksmith that he will not willingly decline to a lower range of work. I am not of course assuming that in a local industrial school he will find anything like the style and variety of work that a great Calcutta firm turns out, but it will be in the same line; and the instruction that he receives will enable him to secure more profitable employment, while it also tends to raise the standard of skill among the artizan class.

5. Secondly there is the whole class of machine tools, which I hope to see introduced into all the more important industrial schools. Steam will not always be necessary, as the motive-power can very well be supplied by cooly labour; though if a small steam-engine could be added, so much the better. It is most desirable to pave the way for the general employment of these tools in the workshops of the country; and this can best be done by training up a number of men familiar with their use. Further, we are now in the flowing tide of the employment of capital, English and Indian, upon manufactures and other remunerative enterprises in India; and it becomes a matter of extreme importance to facilitate its employment by the provision of skilled labour in sufficient quantity. It will of course be understood that we do not aim at training operatives in particular trades, such as cotton-spinners, jute-weavers, or paper-makers. What we require first of all is a supply of trained mechanics, like the "mill-hands" of factories in former

days in England, able to keep in working order, to set up and repair, the necessary machinery; and to design and make the thousand and one small contrivances in wood and iron that enter into the daily requirements of a factory in full work. **No. 18 (*d*). Sir A. Croft's note, 1890.**

6. But in any general scheme of technical instruction worthy of the name, we must aim not only at improving manual skill, but also at developing the mental powers of the students on such lines as will make them better workmen. Drawing is by universal consent an indispensable subject of instruction, enabling the mechanic to work from a plan given to him, and also to draw a plan embodying his own ideas. Modelling is another excellent means of training the eye and hand to observation and correct expression. Much of a responsible mechanic's work consists in computation; and he should have abundant practice in all the processes of arithmetic, so as to make him ready and expert at figures. I do not regard elementary chemistry or physics as being of any particular use either to the mechanic or the foreman as such, though the knowledge may no doubt be of use in particular manufactures. But every workman should know what is understood by the mechanical powers and their applications. I do not think he requires much beyond the subjects I have named; but provision for so much teaching outside the shop should, I consider, be made in every technical school. In this way a capable lad would have the opportunity of becoming an intelligent mechanic, and finally, if he possessed the other requisites of ability and character, of rising to be a foreman. I do not think we need be at pains to distinguish whether our schools are to be for artizans or for foremen; our aim should be to make skilful and intelligent mechanics of them, and natural selection will do the rest. Nor need we be careful as to the classes from which the students come. We can very well take all who offer, provided they are able and willing to go through the course as a matter of business and not merely as the recreation of an amateur;—the carpenter's son, because that is the class whose standard of workmanship we want to improve, and the clerk's son, because we thus open to him another career than that of the pen. The young Brahmans and Kayasths who work at the forge and the lathe in the Seebpore shops are examples sufficient to show that boys of the literate classes are by no means debarred from the practice of hand crafts; and if they are poor, they take to such callings readily enough. It may sometimes be desirable to establish an upper and a lower division in the same school; the upper division consisting of those pupils whose previous education enables them to master the special subjects to be taught in the school; the lower consisting chiefly of artizans' sons without much education, who will therefore have to confine themselves for the most part to manual work.

7. There remains the question of the places at which such schools should be established. Mr. Collin suggests Ranchi, Midnapore, Burdwan, Rajshahye, and Chittagong. At the first two places industrial schools already exist; and under recent changes their constitution will approximate more or less closely to that which I have outlined. The Ranchi school is a Government institution maintained at a cost of R3,094 in 1889-90, of which R1,683, or more than half, was met from the sale proceeds of manufactured articles. The Government grant is R150 a month, to which a sum of R33 a month has now been added from the income of the Ranchi Fair Fund. From the same fund R1,200 has also been provided for furniture, tools, fittings and drawing materials, while R1,000 has been advanced for the purchase of materials, to be from time to time recouped as sales are effected. A Superintendent is to be appointed from among the passed apprentices of the Seebpore Workshops, or with similar qualifications The Mahisadul Technical School at Midnapore was maintained at a cost of R2,125, of which the chief portion was met from the income of an endowment of R5,000 made by the Raja of Maisadal, from private subscriptions and from sale proceeds, Government contributing grant of R50 a month. This school is likewise under the management of a Seebpore apprentice. In both it is desirable that the stock of tools should be replenished and completed from the Seebpore Workshops.

8. As to the other places recommended for the establishment of industrial schools, I am of opinion that we should wait for the local demand to declare itself. There are clear indications that District Boards, as soon as they see the lines marked out for them, and as soon as they have the necessary funds, will devote them to the establishment of industrial schools almost before any other object. This point, it will be observed, is touched upon in paragraph 69 of Mr. Collin's report, on which my opinion is invited. I should recommend that every encouragement be given to District Boards to set up industrial schools with their surplus funds. Some, no doubt, would turn out to be failures where there was found to be no practical demand for such instruction; but others would succeed. Experience alone can decide that point; and meanwhile the desire of a District Board to devote money to setting of a school of this kind may be taken as *primâ facie* evidence that there is a need for it. The Rungpore District Board has taken the lead in this matter, and spends R100 a month in the instruction of about 70 boys, both of the artizan and of the literate class, in carpentry and blacksmith's work, and in drawing, surveying and mathematics. The Board also grants a sum of R50 a month towards the maintenance of a hostel for the pupils, who are drawn from many different parts of Bengal. Mr. Skrine, the Magistrate, to whose exertions the success of the school is largely due, has drawn attention to the want of a trained Superintendent of tools and plant, including lathes for turning wood and metal; and on these grounds he has applied for a grant from Government of R100 a month for five years. The District Board of Backergunge proposes to establish a school of carpentry, blacksmith's work, mathematics, drawing, surveying, *and tailoring*, at a cost of R141 a month, in addition to an initial outlay of R4,182. The Tipperah District Board, which has already established two scholarships of R15 a month each to enable pupils of that district to join the Apprentice Department at Seebpore, has now put forward proposals of a very similar character to those of the Backergunge District Board, for the establishment of a technical school at Comillah. The Purneah District Board proposes to establish a school like that at Rungpore, for the training of mechanics, surveyors, and workers in wood and iron. A sum of R2 000 has been provided in the Board's budget for 1891-92 for the erection of a building and the purchase of tools and plant, and a further sum of R1,245 has been collected from private subscriptions. I am about to recommend all these projects to the favourable consideration of Government.

9. Of a different kind is a proposal made by the Magistrate of Chittagong for the establishment of an artizan school in that town at a cost of R106 a month, payable from savings in the grants for primary schools in Government estates and in municipalities. With that sum he proposes to appoint

No. 18 (d). Sir A. Croft's note, 1890.

a drawing master, carpenter, fitter, and tinsmith, for the technical instruction of pupils who have reached the upper primary standard. A sum of R1,100 is also to be devoted to the provision of workshops and plant. The industrial importance of Chittagong appears to give such a scheme as this every chance of success, provided it is conducted on a sufficiently large scale; and I propose to recommend it to the District Board and the Municipality, with the view of securing sufficient funds to establish it on a satisfactory basis.

10. Private liberality may also be confidently looked to for the establishment of industrial schools. Baboo Jogendro Kishor Rai Chaudhury, zemindar of Mymensing, has recently submitted to Government the munificent offer of an annual grant of R2,000 for the maintenance of an industrial school to be established in the town of Mymensing, together with a lump sum of R10,000 for initial expenses in the way of a building and workshops, tools and plant. With so liberal an outlay, the school can be equipped with every necessary appliance; and there is good reason to hope that it may develop into a useful and successful institution, like the industrial school formerly existing at Dacca.

I may also refer to the Behar Industrial School Fund, with the income of which an industrial school on a thoroughly efficient scale could be set up.

11. It is essential to the success of an industrial school that work of a varied kind should be provided for the pupils after they have passed out of the preliminary stage of instruction. A very considerable sum is derived from sale proceeds in the Ranchi School, and also at Midnapore and Rungpore; but there is a danger that a school may, in the absence of outside orders for general work, fall back upon the manufacture of some speciality for which there happens to be a demand, but which will not give the pupils the varied experience which they need. It is for this reason that the association of the industrial school with the District Board or the local municipality is so desirable, as these bodies would then be more ready to send to the school orders for various kinds of work, such as they must be constantly in need of. The school would also have the great advantage of supervision by the District Engineer, as at Rungpore. The question of sale proceeds is connected with that of stipends to pupils, about which much difference of opinion prevails. Though stipends may be necessary at the outset at a place like Ranchi, where aboriginal pupils with no means of support have to be attracted, yet in general I should be opposed to any system of stipends except such as might be provided from the trade profits of the school (sale proceeds less cost of material), and awarded in somewhat close conformity with the value of each pupil's work. At Midnapore three-fourths of the profits are so awarded; at Barisal it is proposed to award one-half.

12. I find much difficulty, owing to my entire ignorance of the subject, in offering any comments upon the proposal made in paragraphs 80 and 81 of the report, with regard to silk and cotton weaving. It appears from paragraph 29 of the report that there are 1,900 families of silk-weavers in the district of Moorshedabad. If therefore the industry can be revived (though the competition of the cheaper silks of China, Japan, and Italy makes this somewhat doubtful), there would seem to be abundant room for the establishment of a school at Moorshedabad in which improved processes and designs would be taught. Mr. Collin remarks of the ordinary method of spinning silk thread that, if examined by an expert, improvements could probably be effected in it. As to silk-weaving, the requirements are an improved hand-loom, better and more varied designs, and more artistic dyes. Mr. Collin suggests that a silk-weaver from Baluchar, and the well-known silk-dyer from Bishenpore in the Bankoora district, should be attached, if possible, to the school. Mr. Jobbins, Superintendent of the Calcutta School of Art, would, I have no doubt, give every assistance in his power towards supplying the school with designs, though the difficulty in this respect appears to lie in applying them to the loom. Anyhow, if a centre of instruction for the silk industry were once established, it is probable that from many different sources useful information about improved processes and the means of providing them would gradually be collected, even without obtaining the services of a weaver from France. I am inclined to think that the project should be recommended to the Moorshedabad District Board. The Lalbagh Technical School, which can hardly be regarded as a flourishing institution, is supported by the local municipality, and that body might possibly be disposed to divert its grant to the new school, if established. Should the District Board consider the project feasible, I should recommend that a grant should be made by Government towards the support of the school. The Serampore loom, referred to in paragraph 81, might be introduced into the school; and also the improved hand-loom which the Bishenpore weaver saw in the Calcutta Exhibition. It could be readily ascertained, from the catalogue and report of the Exhibition, by what firm the loom was exhibited.

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## *No. 18 (e).—Proposed establishment of a Textile School at Moorshedabad.*

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No. 643, dated Calcutta, the 12th December 1890.

Memo. from—W. MAUDE, Esq., Under-Secretary to the Government of Bengal, General Department,
To—The Municipal Department of this Office.

In forwarding to the Municipal Department of this office the enclosed extract paragraph 1 from the letter from the Director of Public Instruction, No. 6511, dated the 24th November 1890, the undersigned is directed to request that the Moorshedabad District Board may, as suggested by Sir Alfred Croft, be requested to consider the proposal for the establishment of a school at Moorshedabad in which improved process and designs for weaving silk and cotton should be taught.

# No. 18 (f).—Col. McNeill's note on Mr. Collin's report.

No. 18 (f). Industrial training in BENGAL, 1891.

No. 204 G, dated Calcutta, the 19th January 1891.

Memo. from W. B. BESTIC, ESQ., Under-Secretary to the Government of Bengal, Public Works Department,

To—The Secretary to the Government of Bengal, General Department.

ADVERTING to the memorandum from the General Department, No. 172, dated the 4th March 1890, and subsequent reminders, the undersigned has the honour to forward the accompanying notes by the Secretary and Joint Secretary, conveying the opinion of the Public Works Department on the proposals made by Mr. E. W. Collin in paragraphs 63, 65, 66, 70, 71-74, 75, 78, 79, and 83 of his report on the existing arts and industries in Bengal.

2. A copy of the letter from the Manager, Eastern Bengal State Railway, No. 268, dated 14th April 1890, and of its enclosures, on the suggestion made in paragraph 65 that State Railways should afford apprentices instruction on the method adopted on the East Indian Railway, is attached.

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*Note by* COLONEL J. M. MCNEILL, R.E., *Secretary to the Government of Bengal, Public Works Department, on* MR. E. W. COLLIN'S *report on the existing Arts and Industries in Bengal.*

*Paragraph* 63.—The proposal here apparently is that Government should establish special classes and a special lecturer at Seebpur for the training of mining assistants, and turning to Appendix 4 for details of what instruction is proposed to be given, there does not seem to be any difficulty about the first two years' course. For the third year a special lecturer would be required, and opportunities for him to take his pupils to "Assensol or some other centre" for "mine surveying," and practice of mining.

The students would not want to go into the workshops to handle ordinary mechanical tools as those studying for artizans or mechanics do, or at least not to the same extent; but they could no doubt be fully employed for the two years, and properly looked after, if resident, and I am not quite sure about the possibility of this. But the main point is that unless there is some actual guarantee that at the end of the three years some definite number of students, if qualified, will be appointed by some one or more of the Mining Companies, I doubt if there would be any students at all.

If the mining companies will state positively that at the end of the three years they will take on a given number of qualified students, at any rate as probationary assistants, stating on what salary, and also on what terms as to salary, leave and pension the probationers will be confirmed after, say, 2 years, I think the scheme might work. Government must bear the expense of the lecturer and of the proposed 3 months' visits to the mines, and whether it is worth while doing this must depend to a great extent on what number of assistants (if qualified) employment will be found for.

The appendix quoted adds: "The two years at a mine would form a fitting end to training," but this can only be given by those who are working the mines, and if Government meets the first educational cost, it is doing a good deal, and the companies should at least meet all the expenses of the two years at the mines, and give the probationers such pay for the time as is likely to make the scheme take, or, as I said before, I think there would be no students at all.

*Paragraphs* 65, 66.—In these I think the training of "foreman" is put too much on a different footing from that of "artizans" and "mechanics."

In paragraph 64 it is acknowledged that—

> "In Europe and England foremen are not selected for their technical knowledge, nor are there any special means for training them; but they are men who, by dint of steadiness, intelligence and aptitude for command and organization, have raised themselves from the position of ordinary workmen."

Those, then, who aspire to be foremen should go through the same practical course as the mechanic or artizan, and all the students should have equal opportunities for both this practical work and for the more theoretical instruction in the classes. It has recently been resolved to try and make the Seebpore shops more effectual in training apprentices, and so far as that place is concerned, I do not see that much more is suggested, or required.

It is stated in paragraph 65 that "in the workshops on the Eastern Bengal Railway there does not appear to be any system of apprenticeships," but from the accompanying copy of a letter and enclosures from the Manager, this appears to be a mistake. There is a regular system of training apprentices there, the main difficulty noted being to see that the students are properly domiciled and looked after out of working hours. But the system of teaching apprentices obtains there, as in the shops of other Railways and of private firms, and it is not clear that more is required in the way of night schools than already exists, or would be taken advantage of, if provided, unless the proposal be accepted to give certificates or prizes.

Here again I do not think the inducements would be sufficient unless the possession of such certificate were held definitely to give a prior claim to employment afterwards.

It appears that endeavours hitherto to establish such classes have not been successful but with some such stimulant as suggested they might attract students.

No. 18 (*f*). Industrial training in BENGAL, 1891.

It is suggested, however, to establish "industrial schools at Burdwan, Rajshahye and Chittagong in addition to those already established," but in order to train youth as mechanics, it is essential that they should be where real work is done, on a commercial basis. They will never really learn in workshops established simply for educational purposes. This, I think, is generally acknowledged, and, if so, the question is narrowed to where shops for the practical outturn of work already exist; and though it is stated (paragraph 66) that "it is necessary to provide increased facilities for training a higher class of artizans, especially in backward districts," I do not see how it is to be done. To establish workshops for instruction only in out-districts would I think, be useless, as well as costly. The students would possibly have to be paid to attend, and the cost would, I fear, be excessive, as most of the outturn would be of much less value than the raw material worked up, while the students themselves would not see really first class work, not know what to aim at.

As regards the real workshops as the Railways, Seebpore, etc., probably the best plan would be to make attendance at the schools compulsory and to give prizes, even in the first year for small attainments to take the form of increased monthly pay. These might be tenable for one year when they would lapse, unless the holder passed satisfactorily a still higher examination, when the allowance should be raised; and the apprentice might be made to leave if he failed for two years to win anything. I believe some such inducement would be necessary to ensure success, and if introduced in Government shops, possibly the Railway and other Companies would agree to adopt it also.

I may be wrong, but my belief is that lectures at the Dalhousie Institute or some such place, as suggested in paragraph 66, would quite fail to attract the men it is desired to get hold of.

*Paragraph* 70.—The proposal here is to discontinue getting "all structural iron work and machinery direct from England," which opens up a large question. A large Railway Company like the East Indian Railway, having a comparatively steady demand for rolling stock, can probably do as well by carrying on all their manufactory operations here; but this would not be possible, or at least not economically so, if their requirements were very fluctuating either as to quantity or design. Government wants sometimes machinery of one sort, sometimes of another and its requirements as to structural work, large girders, etc., etc., are very varied both as to quantity and design. If machinery were put up here, fit to turn out all its requirments, the first cost would be immense, and much of the machinery would often be wastefully idle. I think, therefore, that most of the heavy orders which Government gives must for a long time be sent to England to be carried out; but at the same time I think that the present stringent orders about Public Works requirements might in many cases be relaxed with great advantage, and so far as this could be done, there would be a direct stimulus to local industries. There is, I believe, now a tolerably uniformly average demand, *e.g.*, for rolled joists and girders up to a certain size, and their manufacture out here would be of advantage all round. This, however, is a point on which the Government of India does not seem inclined to make any alteration; and though I would gladly see the present rules relaxed as far as possible, I do not think it possible to avoid having recourse to the English workshops for all really heavy orders.

The remainder of this paragraph as well as 71, 76, 78, 79, and 83 refer mainly to specialities of Indian manufacture. As regards ornamental brass-work, pottery, clay modelling, etc., I think any attempt to engraft "Art Journal" or such designs on the indigenous patterns would be disastrous, just as far as it was successful; the result would be a hybrid which no one would own or care for. For improvements in cabinet-making, where articles acknowledgedly English designs are being turned out and for cutlery and such work, including of course brass-work (not of native ornamental type), no doubt the introduction of machinery system of moulding from patterns, etc., would be most advantageous; but I do not quite gather whether the proposed "School of Design" is expected to help in such matters or not. If it is, then it must open nicely equipped workshops all over the country, with competent trained artificers in charge of them, to give instruction to native workmen, who would probably require considerable inducement to make them attend even in their own villages.

If not, the improvements must be left to find their own way into the native artizan's shop, as the demand for the articles produced increases. This I take it is the idea, as the proposal is for the present to "trust to the central establishment in Calcutta and to the circulation of designs for improvements in native industries" with a suggestion for "drawing classes for artizans at Patna, Dinagepore, and Dacca" with an offer at first of prizes. The great difficulty would be to get the artizans to attend, as prizes for mere drawing could be carried off by draughtsmen. If the Calcutta school is to issue design leaflets to artizans of all kinds through the country, it must create a set of competent artistic designers, and it must continue to pay them and to issue their design, whether accepted and adopted by the artizans or not. If it is to teach artizans free hand and model drawing the proposal to issue design leaflets over the country falls through. In either case I think Government would have to pay both school teachers and scholars, or the school would be empty.

If there were any likelihood of such a school of design being started, if Government gave a grant in aid, the thing might prove a success; but if such an offer would not start it, the conclusion would only be that the proposal is premature.

I do not see that it is the province of Government to encourage among the native gentry (see paragraph 79) a taste for ornamental pottery any more than for modern furniture, and such instruction as is suggested in paragraph 78 might be given at the local schools, very much as the sewing at English primary schools with which it is compared without having recourse to a central school of design in Calcutta. The proposal in paragraph 83 to provide carvers in order that a demand for ornamental stonework may arise seems to be quite a case of putting the cart before the horse.

Paternal Government may be all very well, but even children must be left to find out some things for themselves.

*Copy of a letter No. 268, dated 14th April 1890, from the Manager, Eastern Bengal State Railway System, to the Chief Engineer, Bengal.*

**No. 18 (f). Industrial training in BENGAL, 1891.**

With reference to your letter No. 1152G, dated 17th March 1890, forwarding Mr. E. W. Collin's report on the existing arts and industries in Bengal, and enquiring if arrangements can be made to take in bound apprentices at the workshop of this Railway, I have the honour to forward herewith, for your information, a copy of the Locomotive Superintendent's report* on the subject, and to state that I agree with that officer in thinking that it would be difficult in this country to arrange for the proper supervision of the apprentices after working hours, and also their proper accommodation.

*No. 331 A, dated 4th April 1890.

2. I am myself very doubtful of the success of any system of training apprentices which contemplates their being practically left to their own devices out of working hours and away from home restraint. I would prefer not to take apprentices unless their parents or friends are in a position to secure them board and lodging with respectable local families.

3. It is I think, open to question whether satisfactory classes could be arranged for the instruction of apprentices in this Railway. Manual labour is much more exhausting for Europeans and Eurasians in this country than in England, and by the time the day's work is over, the apprentice's aptitude for receiving instruction is, as a rule, not great. It will, however, be seen that the arrangement in force here for apprentices provides for their attendance at night schools if considered desirable, and there would be no difficulty in providing instructors in elementary drawing and mathematics.

4. On the question of night schools for apprentices, however, the most valuable opinion could probably be obtained from the Agent, East Indian Railway, as from Mr. Collin's report it would appear that they are actually established at Jamalpore. Night schools for native foremen are established on this line.

5. Mr. Collin's report is returned herewith.

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*Copy of a letter No. 331 A., dated 4th April 1890, from the Locomotive and Carriage Superintendent, Eastern Bengal State Railway, to the Manager, Eastern Bengal State Railway.*

With reference to your register No. 193 of the 19th March last (returned herewith), I have the honour to state that I am surprised to find that Mr. Collin should have stated in his report that no apprentices are employed on this line.

This information was certainly not obtained from me.

I send a copy of the terms of apprenticeship in force for years.

I also send a statement of the bound apprentices now working on the line, besides which we have a few unbound who are shewn separately.

Numbers of apprentices have been trained by me, and have sought employment elsewhere after completing their apprenticeship. Of these I give also a list.

I should employ more apprentices, only I have no proper quarters to give them, or any one to look after them when they have left the works. I therefore make it a rule only to take lads whose parents can arrange with some responsible person in the works to look after the welfare of the lads after work hours.

The best arrangement is to have a building set apart for apprentices in charge of a man and his wife, whose duty it is to look after the apprentices and regulate their behaviour after work hours.

The apprentices at Somastipore were started by me on the same lines that I have always followed both on the Northern and Eastern Sections of this line.

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## EASTERN BENGAL STATE RAILWAY.

LOCOMOTIVE, CARRIAGE, AND WAGON DEPARTMENTS.

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## AGREEMENT TO BE SIGNED BY APPRENTICES.

I agree to serve as an apprentice on the following terms :—

Apprentices, when engaged, to receive for the—

| | | |
|---|---|---|
| 1st year | 20 | per mensem. |
| 2nd ,, | 25 | ,, |
| 3rd ,, | 30 | ,, |
| 4th ,, | 40 | ,, |
| 5th ,, | 50 | ,, |

None of the above increases will be given to men whose conduct has not given entire satisfaction.

In addition to the compulsory deposit of one anna per rupee, each apprentice will deposit four rupees per month in the Government Savings Bank.

In the event of an apprentice leaving the line on which he has been engaged without permission, or in the event of his being dismissed for misconduct, the whole of the amount so deposited will be forfeited to Government.

No apprentice will be allowed to marry during his apprenticeship under penalty of summary dismissal.

Each apprentice will attend the night school if required to do so.

*Dated this* *day* Signed

*of* *189* . State. *Apprentice.*

Signed in the presence of

## EASTERN BENGAL STATE RAILWAY.

*List of Apprentices employed in the Locomotive and Carriage Departments.*

| Names of bound Apprentices. | Date of appointment. | | Stations. |
|---|---|---|---|
| Mr. E. Smith | 4th May | 1885 | Assistant Carriage Examiner, Naihati. |
| ,, M. Bourilhon | 29th June | ,, | Kanchrapara Workshops. |
| ,, R. Bourilhon | 12th October | 1886 | |
| ,, H. Robinson | 12th February | 1887 | |
| ,, A. E. Lewer | 3rd January | 1888 | |
| ,, J. C. Aviet | 12th March | ,, | |
| ,, E. B. Rogers | 4th August | ,, | |
| ,, F. E. Dennison | 3rd January | ,, | |
| ,, J. Johans | 1st May | ,, | |
| ,, E. Abney | 14th June | 1889 | |
| ,, E. P. Echlin | 22nd April | ,, | |
| ,, E. Flynn | 27th September | ,, | |
| ,, A. Coombs | 1st April | ,, | Saidpur Workshops. |
| ,, H. Wallacombes | 1st August | ,, | |
| ,, G. Smith | 1st February | 1888 | Sealdah Workshops. |
| **Names of unbound Apprentices.** | | | |
| Mr. B. Coombs | 1st December | 1886 | Saidpur Workshops. |
| ,, O. G. Rendell | 27th August | 1888 | |
| ,, C. Frampton | 15th April | 1886 | |
| ,, R. Martin | 1st July | 1887 | Sealdah Carriage shed. |
| ,, E. Nichols | 1st July | 1888 | |
| ,, T. Bolst | 21st November | 1887 | Assistant Carriage Examiner, Dacca |
| ,, J. Baptist | 2nd February | 1885 | Now promoted to 3rd Engineer. |
| Baboo J. N. Mozumdar | 2nd November | 1882 | These are English-speaking Bengali Baboos. |
| ,, K. L. Dutt | 2nd July | 1887 | |
| ,, M. L. Bose | 24th October | 1888 | |

KANCHRAPARA;
*The 2nd April 1890.*

A. W. RENDELL,
*Locomotive and Carriage Superintendent.*

## EASTERN BENGAL STATE RAILWAY.

*List of Apprentices who have been trained and have sought employment elsewhere after completing their apprenticeship.*

| Name | Remarks |
|---|---|
| J. B. Hatton | Left of their own accord. |
| H. S. Hatton | |
| H. Dean | |
| W. Cox | |
| C. J. Rooney | |
| R. Collins | |
| E. Dozey | |
| F. W. Lewer | |
| J. Lucas | |
| A. P. McGrath | |
| J. D. Isaacson | |
| R. E. Norton | |
| G. M. Collom | |
| G. Jones | Services were dispensed with on account of reduction of establishment. |
| A. F. May | |
| R. F. Merces | |
| J. F. Statham | |
| J. Ryan | |
| W. A. Fernandez | |
| H. James | |
| J. O. Hutton | |
| C. Graves | |
| A. E. Reid | |
| A. Williams | |

KANCHRAPARA;
*The 2nd April 1890.*

A. W. RENDELL,
*Locomotive and Carriage Superintendent.*

# *No. 18 (g).—Note by Mr. Martin, on Mr. E. W. Collin's report.*

No. 18(*g*). Industrial training in BENGAL, 1891.

*Paragraph* 63.—The course of training recommended by Dr. Saise in Appendix IV of the Report would seem to embrace three years' professional education at one of the Government Civil Engineering Colleges, and two years' practical instruction at a mine, in all five years. At the end of this time the student is to pass an examination and receive a certificate of satisfaction from the Engineer in charge of the Collieries, and then it is anticipated employment would be found for trained men. It is by no means certain that mining companies would be willing to take students into their concerns for two years as "improvers" or apprentices and teach them their business without being paid for doing so. I am afraid that a difficulty would arise at this stage of Dr. Saise's programme, and that the parents or guardians of the students or the Government would be put to some expense during this part of the youth's training.

A pupil who could pass the college examination laid down by Dr. Saise in three years (excluding the practical training at a mine) would certainly be qualified to pass the Assistant Engineer's examination if he devoted his studies to that object. It seems to me doubtful that the parents of a pupil would be willing to incur extra expense, extend the course of studies for two years longer, and defer the chances of obtaining appointments on the bare prospect of his obtaining employment at a colliery, when, on the other hand, he would be almost certain to succeed in passing the Engineer's or Upper Subordinate's examination, when he would become settled in life and draw a salary at an earlier age. Seebpore students nearly always get employment either under Government, the railways, shipping, mills, or private engineering firms. People know this and understand what their son's prospects in life are, while mining engineering is a new thing to them with a strong element of uncertainty about it. I do not think that parents would select such a career for their sons except they were encouraged to do so by the grant of, wholly or partially, free education and training, and above all definite promises of employment at the end of the course. This would involve considerable expense to Government, and even then we have no sort of guarantee that the employment would be forthcoming.

*Paragraphs* 65-66.—I think there is a misapprehension in the part of paragraph 64, where it is stated that "in Europe and England foremen are not selected for their technical knowledge on railways, other engineering works, and in the building trades, such as masons, stone-cutters, plasterers, carpenters, painters, plumbers, etc. The foremen are invariably selected for their superior technical knowledge of their several crafts; the nature of their employment renders this necessary, as they have to supervise, guide, and very often teach the workmen employed under them. Men strive to become superior mechanics in order to attain to the position of foremen, when they secure larger wages and less laborious work. Of course steadiness and respectability are essential qualifications; but superior technical knowledge is a *sine quâ non*. Boys in Seebpore are taught actual practical work and the use of machine tools. They have every facility for learning drawing, studying models of engineering structures and different kinds of machinery, and if a boy has ability and application, he has every opportunity of becoming an excellent foreman.

Mr. Rendell's letter and enclosures attached to letter No. 268, dated 14th April 1890, received from the Manager, Eastern Bengal State railway, show that a large number of apprentices have been trained in the workshops belonging to that line; that many of them are employed under Government as carriage examiners and in various capacities in the locomotive shops, and one is third Engineer of one of the Railway steamers. In course of time these men, if steady, will doubtless rise to the position of foremen, and get comparatively large pay. From the time the apprentices enter the workshops they are paid in a sliding scale from Rs. 20 to Rs. 50 a month, according to the length of time they have been at work, and the degree of experience and usefulness they have attained. The number of apprentices it is found possible to employ is restricted for want of dwelling accommodation for them, and people to look after them when they have left the Railway premises. I think Mr. Rendell's proposal to have a building set apart for the apprentices, and to employ a man and his wife to regulate their behaviour after they leave work, is a good one and might be entertained. The apprentices are generally worth something more to Government than they receive in the way of wages, especially when they have acquired some experience. It would therefore be to the advantage of Government to increase their number. It will be seen from Mr. Rendell's form of agreement to be signed by apprentices that a night school is provided for their general education and instruction in theory.

With regard to the proposal that industrial schools be established at Burdwan, Rajshahye and Chittagong in addition to those already existing, the recommendations in paragraph 66 are excellent, but it is doubtful, I think, that they would be feasible except at a prohibitive cost and great expense to Government. The facilities at present available are insufficient for the purpose and could only be supplied at enormous expense. Besides amateur workshops or those in which real work is not carried out on commercial principles are practically useless as training ground for the class of people under reference. In the same way I think there would be great difficulty in providing "increased facilities for training a higher class of artizans, especially in the backward districts.

*Paragraph* 70.—To discontinue the importation of "all structural iron work and machinery direct from England." The rule on this subject is that all articles of European manufacture should be ordered by indent through the India Office. This rule was promulgated under the impression hat materials and stores of European production could be obtained at cheaper rates through the intervention of the Secretary of State. This might have been the case at one time, but I doubt thati need be so now. Suppose, for instance, that an Engineer requires a pair of iron bridge girders, has ordered them in their manufactured state from the India Office, and has only the carriage of the material and erection to deal with when they arrive in India. The fact that all the operations connected with the manufacture of girders is done in England by English workmen deprives the native mechanics of this country of the same amount of work which might be done out here equally

No. 19 (*a*). Technical education in the CENTRAL PROVINCES, 1889.

well and just as cheaply, and of a considerable amount of employment. The present system cripples local industry to a great extent. If such work were to be done in India, the bulk of it must necessarily be executed by engineering firms in Calcutta, Bombay and other large towns. If it is considered that these firms charge excessive rates, nothing would be easier than to advertise for tenders *simultaneously* in India and in London; and if it is found that the work can be as economically done in India, it would be, I think, clearly to the interests of Government and the welfare of the artizan classes in this country that the work should be manufactured locally.

*Paragraph* 71.—To circulate illustrated price-lists of improved tools in the mofussil might do some good and create a demand for better implements by which the handicraftsman could improve the quality of his work and economize his labour. As far as I know, the natives of Bengal, except in a few localities, possess very little resource and originality in designs. Operatives in Upper India have hereditary taste and are more or less born artists in their several lines of business. To graft Western ideas on to their present excellent designs would lead to a most undesirable conglomeration; but people who are working in the Lower Provinces for other people, who desire things done in the Western fashion, and who have no desire for articles of Eastern art, and probably would not care to pay for them, come under a different category, and in their case to supply them with improved designs of European articles of furniture, etc., would, it appears to me, be a step in the right direction.

I do not think the proposed central school of design in Calcutta for artizans would be productive of much benefit. The workman as a rule lives in the suburbs, and is only too glad to make the best of his way home when the labours of the day have ceased. Nothing would entice him to travel back to town, with a view to improving his mind and acquiring taste or design and art unless he was paid for it.

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# *No. 19 (a).—Sir A. Croft's note on technical training in the Central Provinces.*

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No. 202, dated the 14th March 1891.

From—W. MAUDE, ESQ., Under-Secretary to the Government of Bengal, General Department,
To—The Director of Public Instruction.

I am directed to request that you will be so good as to favour the Lieutenant-Governor with an expression of your opinion on the system of technical training adopted in the Central Provinces, and especially as regards the introduction of drawing lessons in primary and secondary schools. The Lieutenant-Governor also desires to know the extent to which drawing is now taught in schools in Bengal and how far you would wish to extend it.

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No. 3834, dated the 1st July 1891.

From—Sir ALFRED CROFT, K.C.I.E., Director of Public Instruction, Bengal,
To—The Secretary to the Government of Bengal, General Department.

I have the honour to submit the report called for in your No. 202, dated the 14th March last and subsequent reminder, asking for an expression of my opinion on the system of technical training adopted in the Central Provinces, especially as regards the introduction of drawing lessons into primary and secondary schools. I was also desired to state the extent to which drawing is now taught in schools in Bengal, and how far I would wish to extend it.

2. The system of technical education in force in the Central Provinces was thus described in a Resolution of the Chief Commissioner in 1889:—

"In connection with technical education, engineering and agricultural classes were opened at Nagpur. In the former 30 students enrolled themselves, but the number was reduced by test examinations to 11, as it was useless to allow lads whose general edcuation was not sufficiently advanced to waste their time in the class. The Superintending Engineer reports that at his last examination the pupils showed satisfactory progress, and most of them will now go on to the second year's course, a fresh group of candidates entering as beginners. The agricultural class had an average strength of 25 throughout the year. The instruction given is practical as well as theoretical. The students work with their own hands on the model form at all the ordinary agricultural processes. Each has a plot of ground on which he raises for market some of the principal crops. They all learn practical field surveying, and work in the laboratory at the mechanical and chemical analysis of soils. Drawing they learn at the Normal School. Seventeen lads passed successfully at the close of the year under the presidency of Mr. Fuller, the Commissioner of Settlements and Agriculture. All these will now go on to the second year's course.

"All the colleges and high schools and most of the middle schools have now been provided with drawing masters, and the subject is being gradually introduced into the primary schools, as masters can be trained at the Normal schools. A new curriculum has been laid down, containing additional subjects of a technical and scientific character. The Kindergarten system is now taught in the Normal schools; object-lessons are being gradually introduced in primary schools (a special text-book being under preparation), and school gardens are being encouraged as a source both of instruction and amusement for the boys. The old carpentry classes are being remodelled on the Slöjd system to carry on the training of the faculties of observation from the point where the Kindergarten leave

it. 'This system' (writes the Inspector-General) 'attempts by a graduated series of manual exercises, chiefly in carpentry, to train the senses to be fit instruments for the intelligence, and to destroy that cheap contempt for handwork which a purely literary education is apt to encourage. Its primary object is not to create handicraftsmen, but so to train the faculties that boys may be qualified learners of whatever trade they take up when they leave school.' For the Mahratta Brahmin of the Central Provinces, the Slöjd system supplies precisely the corrective which his natural tendencies require. If experience shows that it can be successfully worked, the Chief Commissioner will gladly supply funds for its more general introduction in the middle and upper primary schools."

**No. 19 (a). Technical education in the CENTRAL PROVINCES 1889.**

3. In the following year (1890) a further account is given of the progress made upon these lines:—

"The Kindergarten system has been introduced into a fair number of primary schools. The study of the elements of agriculture has received much attention in schools of the same grade, and the subject has proved a popular one. It is intended when possible to establish school gardens, that the boys may by working in them get practical lessons also. The teaching of drawing is being pushed on, but it will take some time yet before the supply of teachers is equal to the demand..... The primary school teachers are now being instructed at the Normal School in the system of 'hand-and-eye training'— adapted from the Slöjd system by Mr. Ricks, Inspector of Schools of the London School Board—which consists in teaching wood-work, modelling in clay and in card-board, upon the basis of a knowledge of drawing.... The agricultural and engineering classes made good progress during the year. It is in contemplation to affiliate the Engineering class with the Roorkee Institution, with a view to sending successful students to obtain the Roorkee certificates, and to utilise the agricultural class as a means of giving a practical side to the teaching of agriculture in primary schools."

4. I need say nothing on the subject of engineering and surveying, since in Bengal that subject is sufficiently provided for in the two departments of the Civil Engineering College at Seebpore, in the survey schools at Dacca, Patna, and Cuttack, and in technical schools, such as those at Rungpore and elsewhere.

5. With regard to agriculture, I may quote the following remarks from my letter to Government, No. 2395, dated the 25th April 1891, reporting on the proposal to establish an examination alternative with the Entrance examination of the University:—"There are no schools of agriculture now in Bengal, nor do I see any definite prospect of their early establishment, or any (as yet) clearly ascertained use of them if established, though on that question the report of the Committee that has recently investigated the conditions of agricultural improvement in India may be expected to throw some light." Dr. Voelcker, with whom that Committee was associated, has since published in an English journal an article on the subject; and his conclusions, as is now well known, do not afford much encouragement to the advocates of agricultural education in India. His opinion is that Indian agriculture is excellent, and "how to improve it," he observes, "is a problem harder than how to improve English agriculture" He has no belief in the common idea that the ryot's cultivation is primitive and backward, and he goes so far as to maintain that "nearly all the attempts made in the past to teach him have failed, because he understands far better than his would-be teachers the particular circumstances under which he has to pursue his calling." This opinion supplies an argument against the establishment of special schools of agriculture, and in a still higher degree against the introduction of agriculture as subject in primary or middle schools of the ordinary class. For those who are not to live by field cultivation, it is very doubtful whether theoretical agriculture, as a subject of general school education, is of any particular value; while for those who are, they will learn their business more easily and thoroughly under the practical guidance of the persons who will have to teach them. In the Central Provinces several hundred pupils of primary schools passed the examination in agriculture in 1889-90, but the Inspector "is not sanguine of the results of teaching agriculture by men who have no practical acquaintance with the subject. The establishment of school gardens is, however, being encouraged; and this, it is hoped, will supply a means of practical instruction in agriculture, besides "providing boys with healthy occupation"—which may perhaps be regarded as their chief value at present. The special agricultural class at Nagpur was opened in 1888-89 with 20 pupils, but in the following year the number of new admissions fell to 8. But the practical test of the value of such a class is not whether pupils attend it, for in such matters novelty counts for a good deal, but whether their training enables them to secure profitable occupation and to increase the outturn of the land. That is as yet the doubtful point; and it is one which experience alone can decide. In Bengal a step in this direction has been taken, more perhaps in deference to the agitation on the subject than from any conviction of its utility. Agriculture has lately been introduced into the standard for upper primary schools as an alternative with elementary physics, and the change will come into force at the examination of the current year. It is not known whether any large number of pupils will avail themselves of the option offered them.

6. Before going on to consider the elements of technical education (other than agriculture), which are found in the primary schools of the Central Provinces, some preliminary considerations are necessary. In those provinces the number of primary schools for boys in 1889-90 that were either maintained or aided by Government or by a Local Fund or Municipal Board was 1,248, and the number of their pupils 70,412. They received from Provincial Revenues R77,531, from local rates R85,700, and from Municipal Funds R22,365, or altogether R1,85,596 from public funds out of a total expenditure of R2,39,375. Taking average figures, each school of 56 pupils received R62 from Government, R69 from Local Funds, and R18 from Municipal Funds; or in all R149 a year from public funds out of a total expenditure of R192. If attention be confined to Government and Local Fund schools, (excluding aided schools), which form nearly two-thirds of the whole number, and to which the technical courses are practically confined, it is found that each school receives R193 from public funds out of a total expenditure of R225. Contrast this with the very different circumstances of Bengal. Of 38,295 primary schools for boys in Bengal (all but 25 of these being aided schools), each receives on an average R3·5 from Government, R10·8 from District Funds, and R3 from Municipal Funds: or altogether R14·6 a year from public funds out of a total expenditure

No. 19 (*a*). Technical education in the CENTRAL PROVINCES.

of R56 a year. The contrast may be put in a more striking light. If the primary school of Bengal were maintained or aided by public funds on the same scale as those of the Central Provinces the expenditure from that source would amount to nearly 57 lakhs, or more than ten times the amount that is actually contributed from public funds to the support of primary schools. The extraordinary cheapness of the primary system of Bengal compels us to be content with the barest rudiments of education. The teacher's post is worth R5 or R6 a month in cash, besides certain payments in kind of varying value. Hence we cannot expect to get for these schools the highly-trained teachers of Bombay and the Central Provinces: we must be satisfied if we can secure a passed pupil from a middle school who will be able to teach the three R's well enough, but little if anything else. For years past I have urged that we can do nothing that will be satisfactory with the great mass of our primary schools until from one source or another we can spend ten lakhs a year more on them. But even if we had that money, it would only be sufficient to raise the majority of our schools to a standard approaching that of the primary scholarship, and it would not suffice to provide teachers qualified to give instruction in drawing and the Slöjd system. With such a standard, however, I should be quite content for the present.

7. For the present, therefore, if drawing and allied subjects are to be generally introduced, it is only in secondary schools that the attempt can be usefully made. A partial experiment of this kind has already been tried in three Government high schools—at Calcutta, Hooghly, and Dacca, but as yet with very indifferent success. As recommended to Government in my No. 6660, dated the 26th December 1888, and sanctioned in Government orders No. 191, dated the 7th March, and No. 397, dated the 21st May following, drawing classes were opened in the three schools named above at the beginning of 1890. At the Hare School the monthly attendance for the year averaged 14, the number of candidates who went up for examination by the University was 4, and of these 2 passed. At the Hooghly Collegiate School the average monthly roll number was 26, and the average daily attendance 13. At the Hooghly Branch School the monthly roll number was 40, and the daily attendance 24. From the former school 9 boys, and from the latter 2 went up for the examination in drawing, and of these only one passed from the Branch School. At the Dacca Collegiate School the average attendance for the year was 14; one student went up for the examination, but he failed to pass. Considering that each class costs Government R50 a month, the salary of the drawing master (the contingent expenses being only just met by fees), I cannot but consider these scanty results as most discouraging. The Principals are in each case anxious that a further trial should be given to the experiment, and I am certainly not inclined to abandon it because the first results are disappointing. Indeed, as the instance of the Principal of the Dacca College, I have taken a further step, and have made the teaching of drawing compulsory in all the lower classes, leaving it as at present a voluntary subject for the higher classes. No complaints have reached me on the subject; and I am looking forward with some interest to see the results of that step. No blame, I should explain, rests with the drawing teachers, who are passed students of the School of Art, selected for the purpose by the Superintendent, who has also drawn up a careful syllabus for the classes. The defect lies with the pupils, who seem to have, in Bengal at any rate, no taste for drawing, as shown by the small number who join the classes, while those who join have very little aptitude for it, as shown by the much smaller number who pass the University test.

8. The only further attempt that I am disposed to recommend in this direction is the introduction of drawing into middle schools, as indicated in the last paragraph of my letter No. 2395 above-quoted. But as a measure, preliminary to this step, it will be necessary to make drawing a compulsory part of the course in training schools: so that no candidate shall be declared to have passed the vernacular mastership examination unless he has qualified in drawing. In a few years we could thus have a considerable number of qualified teachers of drawing; and we could then give to the subject in the curriculum of middle schools whatever stimulus might be thought necessary, by assigning high marks to it as a voluntary subject, or even by making it compulsory. There is already a teacher of drawing in the Calcutta Training School, where the subject is now to be taught more systematically than before. The additional expense will be a teacher of drawing on R50 a month rising to R60, in eight training schools, together with moderate contingent expenditure for drawing materials, or roughly about R6,000 a year. No fees can be charged in training schools.

9. After drawing has secured a footing in training schools, a further step might perhaps be taken in the introduction therein of the Slöjd system of training. This has replaced the old carpentry classes formerly attached to the middle or primary schools in the Central Provinces. These classes mistook the original purpose of their projectors (which was not to teach a trade), and they proved a financial failure. The system which has replaced it is designed to train the hand and eye. The principal occupations are wood-work, modelling in clay, and in card-board; all being based on drawing. Every student is required to draw to scale plans of the models to be made, and then to make the models from the drawings. But I consider the discussion of this point to be premature, until we have gained some further experience of the aptitude of the Bengali student for drawing when he finds himself forced to take up that subject. At the same time I cannot but attach a very high value to the training of the faculties of observation, and to the inculcation of habits of accuracy, which the system is designed to secure.

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## *No. 19 (b).—Drawing in Secondary schools.*

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No. 440, dated the 4th August 1891.

From—C. E. BUCKLAND, Esq., Officiating Secretary to the Government of Bengal, General Department,
To—The Director of Public Instruction.

I am directed to acknowledge the receipt of your letter No. 3834, dated the 1st July 1891, giving an expression of your opinion on the system of technical training adopted in the Central

Provinces, especially as regards the introduction of drawing lessons into primary schools, and stating the extent to which drawing is now taught in schools in Bengal, and how far you would wish to extend it.

**No. 19. (c). Training of mining assistants.**

2. In reply, I am to say that the Lieutenant-Governor agrees with you that drawing and allied subjects should be generally introduced in secondary schools and eventually in middle schools, but not in primary schools. A partial experiment of the kind has, you state, been already tried in the Government High Schools at Calcutta, Hooghly, and Dacca, but with indifferent success. This, the Lieutenant-Governor observes, is disappointing, and shows how little Bengali youths care for drawing classes and how poor are the results. I am to request that you will be good enough to report after another year the outcome of the experiment, and especially the success that has attended your orders making the teaching of drawing compulsory in all the lower classes of the Dacca Collegiate School.

3. The Lieutenant-Governor approves your proposal that drawing should be made a compulsory part of the course in training schools, and that no candidate should be declared to have passed the vernacular mastership examination unless he has qualified in drawing. His Honour also sanctions the expenditure proposed by you of a sum not exceeding R6,000 per annum for teaching drawing in the eight training schools of the first grade. The charge for the current year will be met from general savings in the education budget.

4. His Honour is willing that the Slöjd system of training should be introduced into the training schools at your discretion.

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## *No. 19 (c).—Training of mining assistants.*

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No. 489, dated the 1st September 1891.

From—C. E. BUCKLAND, Esq., Officiating Secretary to the Government of Bengal, General Department,
To—The Director of Public Instruction.

With reference to the proposal made in paragraph 63 of Mr. Collin's report on the existing arts and industries in Bengal, in which it is proposed that Government should establish special classes and a special lecturer at the Seebpore College for the training of mining assistants, I am directed to say that the Lieutenant-Governor believes that the mining industry is on the eve of immense development, and that there will be a great demand for apprentices in coal-mines. But His Honour does not think that a mining school could be started without being sure of such a demand, and he therefore proposes to enquire from the different Coal Companies whether, on the starting of a mining school at the expense of Government, they would undertake to employ one or more apprentices annually after he obtains his certificate from the mining school, and on what terms. But before taking any action to this effect, His Honour would like to have a scheme of instruction to be imparted to the proposed school, and I am to request that you will be good enough to draw up and submit such a scheme at your early convenience after consulting such persons as you may think fit to address for the purpose.

# GOVERNMENT OF INDIA.

## *No. 20.—Extract from Resolution, dated 7th September 1894, upon Mr. A. M. Nash's Report on the progress of education in India, 1887-88 to 1891-92.*

**No. 20. G. I. Resolution of 7th September 1894.**

14. It has for long been accepted that the educational system should comprise a secondary school course which should fit boys for industrial or commercial careers, and the need from a trade point of view of industrial education for developing the resources of India has also been recognized. Technical education is, therefore, supported by the Government of India as an extension of general education, and industrial education is countenanced so far as it is of a nature applicable to the service of existing industries. The Government of India, in reviewing Sir A. Croft's Report, suggested that schools of drawing and design might be attached to the principal railway workshops, and that in large towns there would probably be found an existing demand for superior skill in industries. Local Governments were enjoined to carry out on an early opportunity industrial surveys which should ascertain particulars as to all important local industries, and to appoint committees of educational experts and professional men with a view to their recommending alterations in the system of public instruction according as the requirements at local centres of industrial progress might render advisable. Chapter VIII of the present Report deals with the subject of technical education. The Note prepared in the Home Department in 1886 recommended that drawing and introductory science should be studied in all middle and high schools; that there should be a practical or "modern" side in high schools; and that a "modern" University Entrance examination should be adopted, as recommended by the Education Commission. It was suggested that special schools in the various departments of Arts should be established; that a technical branch to teach and improve a local industry should be attached in some places to middle and high schools; and that the whole body of technical institutions should be systematized and placed under central colleges to be affiliated to the University.

15. Drawing is now taught in all training schools in Madras, and special inducements are offered to all teachers to qualify in drawing; but it has not been made a compulsory subject of study in the schools. Elementary science is compulsory in high schools, and can be studied in middle schools. In Bombay drawing is taught in all Government High schools and Training schools; and, though it has not been made compulsory, the number of students of drawing has very greatly increased. Some branches of elementary science are required for the Matriculation Examination, and are therefore compulsory in High schools; and an examination alternative to the University Matriculation Examination has been instituted. It does, however, not lead up to a University curriculum; and on the point as to how far its character is modern and practical, as also regarding the projected appointment of an instructor of science to every High school, the information is defective. In Bengal drawing has been made compulsory in Training schools, but its introduction into schools generally is still in the experimental stage: introductory scientific instruction has long been imparted in Upper Primary, Middle, and High schools. A modern side has not been established in High schools, as the Local Government considers it impracticable to effect this change until the Senate of the University will consent to establish an alternative Entrance examination in practical knowledge. The University of Allahabad has agreed to establish an alternative final examination for High schools, which may also be a Matriculation examination for those who purpose to study science. The general appointment of drawing teachers in the North-Western Provinces and Oudh has been suspended until funds become available for the establishment of a School of Art. Neither drawing nor science is a compulsory study in the schools in the Punjab; but the University has determined to hold an alternative Entrance examination in practical knowledge, and also a clerical and commercial examination which will not lead up to a University course. In the Central Provinces drawing has been made compulsory in Primary schools and optional in Middle schools. Physical science is compulsory in Government Middle schools, and lessons on common objects are given in Primary schools. Manual training has been introduced, but it has been found advisable to render it optional only. In Burma drawing has recently been made compulsory in Government and Municipal schools. In Assam the subject appears still not to be taught: a certain amount of science is taught in Middle and High schools.

16. Passing from what are considered the preparatory stages to technical education itself it is remarked that amalgamated rules were published in Madras at the beginning of 1893. The rules prescribe examinations of three grades: elementary, intermediate, and advanced; the subjects embraced being Engineering, Physical Science, Geology, Biology, Sanitary Science, Agriculture, Veterinary Science, Commerce, Music, Drawing, and the work of various trades (Jeweller's, Printer's, Shoe-maker's, Lace-maker's, Cook's, etc.). Diplomas and certificates are awarded for passing at once in several of the subjects. The system is one of testing rather than imparting knowledge, and departs from the intentions of the Government of India in dealing directly with the actual work of various trades. Mr. Havell, Superintendent of the Madras School of Arts, conducted extensive enquiries, but a complete industrial survey has not been carried out in Madras, nor has agricultural instruction been introduced in Government High and Middle schools; industrial classes have been attached to a few schools. The Victoria Technical Institute, Madras,

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founded as a memorial of Her Majesty's Jubilee, has an invested capital of R1,42,000; it is stated that, when the building is completed, a technical library and museum will be opened, and arrangements made by delivering lectures and holding classes to constitute it an Upper Secondary Technical school. Hitherto the Institute's funds have been expended in giving stipends tenable by students at institutions where science and art are taught, and in providing certain lectures. The building referred to is a portion of the Connemara Fort Library building, and after construction is to be placed at the disposal of the Victoria Institute, the Government retaining the ownership. At the Madras School of Art the number of students has risen between 1886-87 and 1891-92 from 265 to 426, and the institution seems to be flourishing and useful. The Government of India are now considering, in communication with the Secretary of State, the position which should be assigned in the educational system to this and the other Schools of Art. The College of Agriculture at Saidapet has been re-organized, but hitherto the number of students shows a decrease. From the account given of industrial schools (often charitable institutions) in Madras it appears that in many of them boys are simply being trained to trades.

In Bombay the "Reay Art Workshops" were in 1890 added to the School of Art, and speedily received numerous apprentices in wood-carving and other artistic industries. The Victoria Jubilee Technical Institute, founded chiefly with subscriptions to the Ripon Memorial Fund and with money designed to celebrate the Jubilee of the Queen-Empress, was opened to students in 1888. The course was calculated to train a student in three sessions to be a fair mechanical engineer. A large number of students were immediately obtained. The Ripon Textile School is attached to the Institute. In the Fifth Annual Report of this Institute (which is perhaps the most advanced in India) it is stated that there had been 1,148 students in all during four years, and that all the Textile and many of the Engineering students who had completed the course had found ready employment. The Institute is provided with buildings and apparatus for its Engineering and Textile branches, and is resorted to from all parts of India, and even from abroad; other branches are to be established whenever funds are available. The Bombay Government considered that it had sufficient information about local industries without ordering an industrial survey. The Poona College of Science contains classes in science, engineering, and agriculture, besides classes, independent of the University, for training subordinates of the Public Works and Forest Departments. The numbers in the agricultural classes have somewhat diminished since 1887, employment not being assured to the students. Apprentices in the industrial department have risen from 76 to 110, and more cannot be admitted. Agricultural classes are attached to some of the High schools and to two Training schools. A Veterinary college was established at Bombay in 1886. There were 16 Industrial schools in 1892, besides industrial classes attached to ordinary schools.

The Government of Bengal deputed Mr. E. W. Collin in 1889 to make an industrial survey of the Province. He reported that, generally speaking, the industries were scattered and unimportant. His proposal for a school for mining students is said to be still under discussion. Other proposals by Mr. Collin related to the training of foremen for factories and workshops, and of artizans and mechanics; but he did not recommend the establishment of industrial branches of Primary or Secondary schools. Arrangements for accommodating apprentices to be trained in railway workshops are stated to be under the consideration of the Bengal Government, and a scheme was in 1891 directed to be prepared for the establishment of a silk-weaving school. The number of students of land surveying has risen greatly in Bengal, and they are said all to find employment with ease. The Local Government has raised the qualification for admission to the Seebpore Engineering College and also the maximum age, has provided instruction and machinery to enable the students to undertake larger pieces of work in the workshops than heretofore, and has improved the prospects of the students by the guarantee to graduates in engineering of certain appointments in the Public Works Department. The number of students in the Engineer classes rose from 44 to 87 during the quinquennium. The Calcutta School of Art trains general and engineering draughtsmen, architects, modellers, wood-engravers, and lithographers. The course of instruction was revised in 1887. The students, who pay R3 each per mensem as fees, have increased from 152 to 181. Instruction in design is sometimes given in the school, but regular classes for this purpose have not as yet been formed. There are 21 Industrial schools in Bengal; they appear from the later reports received to be more flourishing than was believed by Mr. Nash, and the instruction is not in all of them confined to teaching trades, but the future of these institutions can hardly as yet be regarded as assured.

The Government of the North-Western Provinces and Oudh concluded in 1890 that the chief need was higher training in the new mechanical industries introduced by British capital into the Province. A Committee was appointed to deal with the question of training skilled mechanics. The practical recommendations of this Committee, which chiefly relate to the rules of the Thomason Engineering College at Roorkee, and to establishing a School of Art at Lucknow and certain schools for the children of railway and foundry artizans, are described in paragraph 183 of Mr. Nash's Review. An Industrial school has been opened at Lucknow, and an Agricultural school has during 1893 been established at Cawnpore: the changes proposed in the Roorkee College have been reported to the Secretary of State.

In the Punjab a Committee was appointed which submitted suggestions regarding agriculture as well as other topics, and also respecting the training of artizans. Standards for Industrial schools have been drawn up and grants offered to schools under private management teaching them; all the Industrial schools of the Province are under the supervision of the Principal of the Mayo School of Industrial Art. The number, however, is as yet inconsiderable. A Railway Technical school, intended for the sons of railway artizans, was opened at Lahore in 1889, and speedily filled; a new building has now been erected, costing R45,000, and capable of accommodating five or six hundred scholars. The aim of the institution is to give instruction preliminary to the practical training of the real workshop. An industrial survey was not carried out, as existing industries are little developed. Design and decoration are said to be well taught in the Mayo School at Lahore, in which the number of students has increased from 82 to 134.

In the Central Provinces an industrial survey was carried out in 1888-89, but the industries were found not to be of such importance as to justify expenditure on technical instruction in connec-

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tion with them. Fifteen technical scholarships are (it appears from the Report) offered by the Administration annually, tenable for two years in the workshops of the Bengal-Nagpur railway. An Engineering class was opened in July 1888 at Nagpur; the students easily find employment, but their number is still small. An Agricultural class was opened also in 1888 in connection with the Nagpur Experimental Farm. The course lasts two years, and includes practical work in raising crops, besides the principles of agriculture, elementary chemistry, and kindred subjects. Dr. Voelcker, Consulting Chemist to the Royal Agricultural Society of England, on visiting Nagpur, considered this to be the best agricultural class he had seen, and ascribed particular merit to the plan of prescribing the practical work of raising crops.

In Lower Burma an industrial survey has been carried out. Grants are offered to aided schools for teaching a number of arts or trades; but, according to the Report, technical training has not been taken up by any of them systematically. Eight stipendiary apprenticeships are given yearly in the State Railway workshops at Insein.

There is little demand for technical education in Assam, and the establishment of certain scholarships to be held by Assam boys attending the Seebpore College in Bengal has been considered sufficient.

17. The agricultural aspect of technical education was considered in the instructive report on Indian agriculture which was prepared for the Government of India by Dr. Voelcker, and his suggestions were subsequently made the subject of examination by two Conferences summoned by the Revenue and Agricultural Department of the Government of India to deal with that report. The conclusions and recommendations made by Dr. Voelcker were thus stated in his report:—

> The spread of education will be an important element in the improvement of agriculture. It will do much to remove the prejudices attaching to "caste" and custom which prevent progress in agricultural methods, and it will give rise to a more intelligent farming class.
>
> In a country where, as in India, agriculture is the chief employment, agricultural education especially should be encouraged. Until lately the tendency of education has been in a purely literary direction, and has turned attention away from the land rather then towards it; the fault can now be best remedied by substituting agricultural education for a part of the present educational programme. The work must proceed simultaneously from above downwards and from below upwards. Elementary instruction should be given in Primary schools by means of "readers" and "object lessons" which introduce familiar agricultural subjects. In Middle schools the elements of physical science, the use of agricultural primers, accompanied by *Illustration Plots* on which the ordinary farm crops are grown, should form part of the instruction. In High schools more attention should be given to physical science and to agriculture, and *Illustration Farms* or fields should be attached to the schools. Agricultural classes should be established where colleges or institutions that especially teach agriculture do not exist, and these should have *Demonstration Farms* attached, and land on which the pupils can themselves work.
>
> Special attention should be directed to the agricultural education given in colleges, in order that the teachers supplied to High schools and to agricultural classes may be well trained men, and that the Land Revenue, Agricultural, and cognate departments may be supplied with subordinate officials who have studied Agriculture, both theoretically and practically.
>
> I do not consider it advisable to establish special Agricultural colleges, but I think that it would be better to utilize existing colleges of science and to form agricultural branches at them. Universities should encourage the study of Agriculture by making Agriculture an optional subject in the course for a degree, and the claims of men who have passed in Agriculture should be fully recognized for appointments in the Revenue and cognate departments.
>
> There is great need of Agricultural text-books suited to the circumstances of the diffe ren parts of India, and these should be in the vernacular as well as in English.
>
> That general education be extended among the agricultural classes.
>
> That agricultural education form a part of the general educational system, and be introduced as a prominent subject in the schools of the country.
>
> That text-books on Agriculture adapted to the different parts of the country be prepared as early as possible.
>
> That encouragement be given to the higher study of Agriculture by recognizing more fully the claims of men who have passed in Scientific Agriculture for appointments in the Land Revenue and cognate departments.

Since the submission of these remarks sufficient time has not elapsed for much progress to be made, but there is a general tendency to modify the course of primary instruction which will meet some of the suggestions made by Dr. Voelcker. For example, drawing has been introduced and agricultural primers or readers have been prescribed. In some instances hand and eye training of the Kindergarten description and experimental gardens have been tried, but no substantial measure of success has been attained in either of these directions. Experimental farms, with schools attached, have been established in some Provinces, and in them greater success has been obtained. On the whole, the Government of India are of opinion that the question is one which cannot be forced, but should be dealt with gradually, and that greater success is to be expected from making instruction in the rudiments of agriculture part and parcel of the primary system of instruction in the country than from teaching it as a subject apart from the general educational programme. As a matter of fact, the Indian cultivator's methods, though empirical, are well adapted to his environment; and, as Dr. Voelcker says, we ought not to look so much to teaching improvement in any particular agricultural process as to the general enlightenment of the agricultural classes, and that expansion of their minds which will enable them to perceive for themselves the small reforms which are within their means and opportunities. It will be the object

of the experimental farms, which Local Governments and Administrations may as opportunity presents itself establish, to make those experiments in improved agriculture which, when successful, will no doubt gradually filtrate downwards to the cultivating masses.



## *No. 21.—Sir E. Buck's Report of 1901.—(Not printed.)*

## *No. 22.—Letter from the Government of India* re *encouragement of technical education, completion of industrial surveys and state technical scholarships.*

Nos. 501—508, dated the 20th November 1901.

From—J. P. HEWETT, Esq., C.S.I., C.I.E., Secretary to the Government of India, Home Department,

To—Local Governments.

Practical and Technical education.

In continuation of my letter No. , dated 6th November 1901, I am directed to address with special reference to the Resolutions passed by the recent Educational Conference at Simla in regard to Technical education (copy enclosed). This matter has already formed the subject of a report which was prepared by Sir Edward Buck after investigating the subject during the cold weather—1900-01, a copy of which is forwarded herewith. Speaking generally, a good deal has already been done in India for Technical education in the higher forms. There have long been excellent Medical and Law institutions in the country, in addition to the Colleges for the training of engineers, mechanics, electricians, overseers and surveyors, Government officials in the Land Revenue and Forest Departments, veterinary officers and teachers in Technical Schools, as well as foremen to be employed in railway work-shops, cotton-mills, mines, and similar industries. The Government of India have no fault to find with the general principles upon which these institutions have been established and conducted. Their maintenance and further development are matters of the utmost importance, towards which the attention of the Local Governments concerned should be continuously directed; but they are already to a large extent doing the work that is required of them, and what is most urgently needed is the extension of Technical and Industrial education in other directions.

Schools of Art.

2. Local Governments and Administrations have not been backward in the encouragement of Technical and Industrial education of different kinds. Schools of Art have been established by the State at Madras, Bombay, Calcutta, and Lahore, and almost every variety of Technical and Industrial School has been attempted in one Province or another. The question whether Schools of Art should continue to be maintained by the State was discussed in connection with Lord Kimberley's Educational Despatch No. 128, dated the 9th November 1893, and the Report of the Art Conference, which was assembled in Lahore in 1894. The conclusion of the Government of India was that in the then existing stage of Technical education, it would be a mistaken policy to insist on casting all the provincial arrangements regarding Technical or Art Schools in the same mould. They considered it desirable that each Province should work out the scheme for such institutions on its own lines, and anticipated that the experience thus gained would facilitate the formation of broad and general conclusions. In his Educational Despatch No. 9, dated the 6th February 1896, the Secretary of State agreed that it was inexpedient to withdraw State aid and control from Indian Schools of Art, and that public expenditure on them is justifiable on condition that they are so directed as to be really beneficial to Indian art. After stating that instruction in drawing should from all points of view find a place in a School of Industrial Art, Lord George Hamilton proceeded to lay down that the main function of a School of Art should be to improve the Arts and Industries of the country. Nevertheless the information placed before the Conference as regards the recent working of these institutions tended to show that the principles referred to have been to a great extent overlooked in practice. The conclusions of the Conference on the subject are based, in the opinion of the Government of India, upon thoroughly sound principles. It is not necessary to refer to them in detail, but I am to request that the system under which the School of Art in is managed may be so modified as to bring it into accordance with the general principles which have now been laid down.

Industrial Schools.

3. The development and organization of Industrial Schools is, however, the matter connected with practical education that appears at the present time to be of the most urgent importance. The conclusions of the Conference are entirely accepted by the Government of India, and it is only necessary to make a few remarks in respect to them. In the first place, I am to say that the Governor General in Council attaches great value to the dissociation of Technical education from ordinary literary education. The Technical or Industrial School should be strictly limited to scientific and technical courses. Every endeavour should be made to secure that students, before entering Industrial Schools, have been properly grounded in the simple forms of education mentioned in the fourth

Resolution of the Conference on the subject, but it is recognized that it may not always be possible to secure that the student, when he enters, shall already have received due amount of ordinary education. In order to meet the cases of such peoples, and to secure that they shall not, after leaving an Industrial School, enter the world without any literary education whatever, it may be desirable to arrange for their instruction either in night schools or in special classes. But this education should not be conducted in the Technical or Industrial School itself.

With reference to the general principles formulated by the Conference, I am to refer to the successful establishment and extension of the aluminium industry in Madras by Mr. A. Chatterton, at present Principal of the School of Art in that Presidency. Mr. Chatterton has been able to employ on the manufacture of articles in aluminium 600 men, who were formerly employed in the copper industry. It seems very likely that, but for the development of this particular industry, the articles formerly produced by the workmen now employed on it might have been supplanted in the Indian market by articles manufactured in other countries. Mr. Chatterton has been successful in his efforts to develop this new industry—a result which the Government of India regard as extremely satisfactory in itself. It seems, however, to them that work of this nature lies outside the scope of the Education Department. The success achieved by Mr. Chatterton has been due to his peculiar qualifications for the work which he has undertaken. Such qualifications are not ordinarily to be expected or desired in an educational officer, and the Government of India wish it to be distinctly understood that commercial enterprises, such as this, must not be undertaken as a part of the scheme of Technical education in India. If any Local Government feels that special efforts are required to organize or to help any particular industry from the mercantile point of view, they should either invoke the assistance of private enterprise, or should arrange for its development by means of special officers not connected with the Education Department.

4. The scheme which the Conference prepared for Industrial Schools is, in the opinion of the Government of India, practicable and complete. Briefly the principles embodied in their conclusions are that Industrial Schools should be devised to encourage particular local industries or trades; that the best type is the local Trade or Crafts School; that they should be educational and not commercial institutions; that in country districts they should be devoted to the study and development of single indigenous products; that in towns they should deal with manufactures, and that these several industries may there be collected in one building; that only pupils shall be admitted to a school who intend to practise the trade taught there; that the system of paying pupils to attend such schools should be abandoned and fees be levied where this is advisable without injuring the stability and popularity of the school, and that grants-in-aid should be given to assist Craft Schools established by private agency to develop local industries.

5. As a preliminary to the institution of Industrial Schools on these lines, it is necessary that the Local Governments and Administrations should ascertain from the industrial surveys made in accordance with the request made in the Home Department letter No. 14—457, dated the 2nd November 1888, what are the local industries and manufactures which can be utilized and encouraged. It seems desirable therefore that these surveys should be brought up to date. In order to make the scheme of Industrial Schools sketched out by the Conference a success, it is essential that the industries to be encouraged should be studied carefully by competent persons capable of instructing teachers who will be able to impart their knowledge to others. In some instances, such teachers will possibly be available already: in others it may be necessary to import for limited periods men from Europe, who will first of all study the industry *in situ*, and subsequently, at a convenient centre, train the teachers in it. The Governor General in Council will be glad if

will now set about the preparation of a scheme in order to carry out the principles laid down by the Conference. It is his intention to depute a small committee of experts to visit the different Local Governments in the forthcoming cold weather, in order to consult them, and to assist them in working out practicable schemes. The Local Government is therefore requested without delay to commence its consideration of the subject, so that a frame work may be ready for examination with the Committee, when the latter visit the head-quarters of the Local Government.

6. The examinations by the Conference of the subject of Technical education terminated in a resolution recommending the institution of a number of State Technical scholarships for the encouragement of the further studies of Indian students in the higher branches of Technical education.

Technical Scholarships.

This proposal is accepted by the Government of India. The existing State scholarships of £200 a year are given in rotation to students from the different Universities, and are subject to the condition that the holders must proceed to England to study at one of the Universities there. The Government of India propose that the number of Technical State scholarships to be given should be ten a year, two of which should be distributed to the Madras Presidency, two to the Bombay Presidency, and two to Bengal, the remaining four being distributed among other Local Governments and Administrations, in whose territories technical instruction has not as yet made the same advance as in Madras, Bombay and Bengal. It is considered that the selection of the students to hold these scholarships should be made by the Local Governments subject to the approval of the Government of India; that the Universities should have no power of nominating to them, and that no candidate should be considered qualified unless he has displayed in his educational career an aptitude for technical study. Subject to these conditions, the Government of India would propose to leave a wide discretion to the Local Governments in selecting candidates for their approval. The course of instruction and the place at which a scholarship-holder is required to study will have to be strictly laid down by the Local Government in the case of each selected candidate prior to his departure from India. In ordinary circumstances the period for which a scholarship might be held should be two years, but in special case it might be necessary to extend the term to a third year and in other cases even to reduce it below two years. In the opinion of the Government of India, these scholarships should be tenable in foreign countries as well as in Great Britain. The Government of India are prepared to give to the holder of a Government Technical scholarship £100 a year, as well as to provide him with a second class passage to and from the place at which he will have to study, and to pay the fees at the institution where he is to be sent. I am directed to ask as to the details for working out this scheme.

# *No. 23.—Resolutions of the Simla Conference (1901) on technical education.*

No. 23. SIMLA Conference Resolutions, 1901.

## I.—General Principles.

1. That Technical Education may be here defined as—

(*a*) the study of the scientific methods and principles underlying the practice of any handicraft, industry, or profession;

(*b*) the application of those methods and principles to the practice of the handicraft, industry, or profession in question.

The first is the primary or technological aspect of the subject; the second is its subsequent and practical application.

2. That all technical instruction must rest upon the basis of some preliminary education of a simple but practical nature.

3. That this preliminary education is better communicated in existing schools and institutions, *i.e.*, as a department of Primary or Secondary Instruction, than in Technical or Industrial Schools.

4. That it should, as a general rule, include such subjects in the Primary grades as the free hand drawing, simple hand-work, and the elementary principles of natural science.

5. That where it is considered necessary or desirable to give this education to artisans in connection with Technical or Industrial Schools, it should be provided for by special classes attached to them; and that a clear differentiation should be made between (*a*) literary, and (*b*) scientific and technical courses.

6. That the functions and activity of the Education Departments, both of the Government of India and of the Local Governments, should be devoted to the promotion of Technical Instruction, rather than to the development of trade; in other words, that a clear line should be drawn between educational effort and commercial enterprise.

7. That the supply or development of the existing Indian markets, in so far as this is likely to result from Technical Instruction, is of superior importance to the creation of new export trades.

8. That in so far as the mercantile aspect of the question calls for separate organization or help, this should be provided for either by private enterprise or by special departments or officers distinct from the existing Educational staff.

## II.—Higher Forms of Technical Education.

9. That Technical Education in India has hitherto been mainly directed to the higher forms of instruction required to train men—

(*a*) for the Government Service as engineers, mechanicians, electricians, overseers, surveyors, Land Revenue officers, and teachers in schools;

(*b*) for employment in railway workshops, cotton mills, mines, etc.

10. That the institutions which have been established for these purposes, such as the Engineering Colleges at Rurki, Sibpur and Madras, the College of Science at Poona, the Technical Institute at Bombay, the Engineering School at Jubbulpore, etc., the majority of which are affiliated to Universities, and train up to University courses, have done, and are doing, valuable work, and that their maintenance and further development are matters of first importance; but that the first call upon fresh Technical effort should preferably lie in other directions.

## III.—Schools of Art.

11. That the true function of Indian Schools of Art is the encouragement of Indian Art and Art industries; and that in so far as they either fail to promote these arts or industries, or provide a training that is dissociated from their future practice, or are utilized as commercial ventures, they are conducted upon erroneous principles.

12. That the first duty of Indian Schools of Art should be to teach such arts or trades as the pupil intends to practise when he has left the school.

13. That these fall naturally into two classes—

(*a*) such arts, as designing in special reference to Indian arts and industries, drawing, painting, illumination, modelling, photography, engraving, which may be taught either to those who intend to practise them professionally in the future, or to drawing masters in schools;

(*b*) such art industries as are capable of being practised in the locality, and in which improvement is capable of being introduced by instruction of the pupils or workmen by means of superior appliances, methods or designs.

14. That the practice of these arts or art industries should be directed to the improvement of the skill and capacity of the pupil or workman, and thereby to their expansion, and should not be pushed to the point of competing with local industries organised upon a caste or trade basis, or of doing within the school what can equally well be done outside, or of usurping the sphere of private enterprise.

15. That samples of the wares produced in Schools of Art may legitimately be kept for sale or for orders, and may profitably be exhibited in public museums, but that it is undesirable to convert

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the schools into shops, or for Government Educational officers to be responsible for extensive commercial transactions.

16. That it is desirable that a register of the workmen or pupils should be kept on their leaving the Schools of Art, with the object of enabling any orders that may be received to be placed to advantage.

17. That teaching in the Schools of Art should be in the hands of experts trained as a rule in Indian colleges, or in Art Schools.

18. That the specialisation of a limited number of arts and art industries in the several Schools of Art should be preferred to the simultaneous teaching of a large number.

19. That free admissions and scholarships should, as a general rule, be discouraged, and should gradually be replaced by payment of fees; but that this is compatible with the assistance of necessitous cases, and with the payment of wages to the pupil or workman as soon as his work becomes of value.

## IV.—Agricultural Colleges and Schools.

20. That the existing Agricultural Colleges (Madras and Poona) have been organised upon a theoretical rather than a utilitarian basis, leading up to agricultural diplomas or degrees, and have been directed to the training of Government officials in the Land Revenue and cognate services, rather than to the teaching of practical agriculture to members of the land-owning class.

21. That the interest of both classes may be served by the institution of Agricultural Schools in which practical work is conducted on an experimental farm, *pari passu*, with simple veterinary teaching, and, where required, with instruction in surveying, village accounts and records, Land Revenue law and procedure, and the principles of agricultural science; that there may be two departments in these schools, one conducted in English, and the other in the vernacular, and that the vernacular department may conveniently be utilized for the instruction of village schoolmasters in the elements of agriculture.

22. That it is for consideration whether a School for the practical teaching of agriculture to land-holders might be instituted by Government.

## V.—Industrial Schools.

23. That a survey of the existing Industrial Schools in India leads to the conclusion that they have been wanting in definiteness both of methods and objects, that there has been no clear differentiation between general and technical studies in the , that they have depended for initiation and support upon the volition of local bodies rather than upon any sustained policy of Local Governments, that they have been insufficiently co-ordinated with particular local industries or trades, and that the impression produced by them either upon industrial development, or upon industrial educations, has been relatively small.

24. That the instruction given in such schools should be technical in preference to general, specialised instead of diffuse.

25. That the form of Industrial School recommended by the Conference for future adoption where practicable, or for encouragement by grants-in-aid where it already exists, is a Local Trade or Crafts School, directed to the furtherance or development of a local industry, which appears to be capable of expansion by the application of superior methods or implements.

26. That such schools may be either country or urban, according as the industry in question is practised in the country or in towns.

27. That in country districts such schools will best be devoted to the study and development of single indigenous products: in towns to the development of manufactures; and that in towns it may be possible to collect several industries in a single building, and to give instruction in diverse branches of industry or manufacture.

28. That such schools, whether country or urban, should be primarily educational, and not commercial institutions; that they should be, as far as possible, self-supporting, but should not compete with established private trades.

29. That only such pupils shall be admitted as will proceed to practise the industry taught.

30. That the levy of fees is a proper feature of Industrial schools, but that it is dependent upon the position and means of the pupil and the stability and popularity of the institution, and cannot everywhere be enforced in the early stages.

31. That it will be a necessary preliminary to the institution of such schools to ascertain what are the industries or manufactures to which they may be applied, in the light of the Industrial Surveys already made.

32. That, where it is considered possible to open new or extended markets for the produce of the industry or manufacture thus developed, it will probably be found desirable to connect them with Commercial Museums, both in and outside of India.

33. That for the present the best available teachers, overseers, and foremen for these schools should be procured either in India or from abroad; but that in time it is hoped that they may be produced in larger numbers by institutions at suitable centres in India, where the investigations of products and industries can be carried on.

34. That in provinces where the suggested developments admit of wide or rapid growth, it should be for the consideration of the Local Governments whether a separate Technological Department of Government may in time be instituted, for their especial supervision and control.

## VI.—State Scholarships.

35. That it is desirable that the Government of India should institute a number of State technical scholarships, perhaps ten in number, with an approximate allowance of £100 a year, in addition to travelling expenses and fees, to be awarded annually in fixed proportions by the Local Governments, subject to the sanction of the Government of India, to selected candidates, who should be sent abroad to undertake definite courses of study in subjects connected with industrial

science or research. That these scholarships might be held for an average duration of two years.



## *No. 24.—Despatch to the Secretary of State* re *technical scholarships.*

No. 8, dated Simla, the 9th October 1902.

From—The Government of India, Home Department,

To—The Right Hon'ble LORD GEORGE FRANCIS HAMILTON, His Majesty's Secretary of State for India.

We have the honour to advert to Your Lordship's Despatch No. 105-Public (Educational) dated the 2nd August 1901, with which you forwarded a question asked in the House of Commons by Sir M. M. Bhownaggree and the answer given thereto on the subject of founding additional Government scholarships for natives of India who might desire to pursue technical studies in Great Britain or other countries of Europe.

Your Lordship at the same time expressed a wish to be informed of the result of our deliberations in the matter.

2. The question of the institution of State technical scholarships formed one of the subjects which came up for discussion before the Educational Conference held at Simla in September 1901, and the following resolution was then passed :—

"That it is desirable that the Government of India should institute a number of State technical scholarships, perhaps ten in number, with an approximate allowance of £100 a year, in addition to travelling expenses and fees, to be awarded annually in fixed proportions by the Local Governments, subject to the sanction of the Government of India, to selected candidates, who should be sent abroad to undertake definite courses of study in subjects connected with industrial science or research. That these scholarships might be held for an average duration of two years."

3. In our letter * addressed to Local Governments and Administrations on the 20th November 1901, relating to the subject of practical and technical education, we informed them that the Government of India accepted the recommendation of the Conference as to the institution of ten State technical scholarships, and that they proposed to give two of them to the Madras Presidency, two to the Bombay Presidency, and two to Bengal, and to distribute the remaining four among the other provinces, where technical instruction had not yet advanced so far as in the three provinces mentioned. It was suggested that the selection of the students to hold these scholarships should be made by the Local Governments subject to the approval of the Government of India; that the Universities should have no power of nominating to them; and that no candidate should be considered qualified unless he had displayed in his educational career an aptitude for technical study. Subject to these conditions, it was considered that a wide discretion should be left to the Local Governments in selecting candidates for the award of these scholarships. We stated our opinion that in ordinary circumstances the period for which the scholarships might be held should be two years; but that in special cases it might be increased to a third year or even reduced below two years; and that the scholarships should be tenable in foreign countries as well as in Great Britain. The Local Governments and Administrations were asked to submit their views as to the details for working out the scheme.

* Extract enclosed.

4. The replies of the Local Governments and Administrations to our communication have received careful consideration at our hands, and we have now the honour to enclose a copy of them for Your Lordship's information. It will be seen that the outlines of the scheme sketched out by us have been generally accepted, but that there is a divergence of views in connection with the details. The scholarships are to be given for the purpose of providing for natives of India the higher technical education which may qualify them to assist in promoting the improvement of existing native industries and the development of new industries, wherever this may be possible. Technical education for this purpose may be defined as (*a*) the study of the scientific methods and principles underlying the practice of any handicraft, industry, or profession, (*b*) the application of these methods and principles to the practice of the handicraft, industry, or profession in question. Law, Medicine, Forestry and Veterinary science being already provided for, are not included among the subjects to be studied by the holders of these technical scholarships, and Agriculture does not fall within the scope of the present scheme. The scholarships will be awarded by the Government of India upon the recommendation of the Local Governments, and will for the present, as already stated, be distributed as follows :—Two annually to the Madras Presidency; two to the Bombay Presidency; two to Bengal, and the remaining four among other Local Governments and Administrations.

5. We do not propose to prescribe the particular industries for the encouragement of which particular provinces should give scholarships. The Local Government or Administration which is asked to recommend a candidate will consider what industries are of importance in the province, and which of them may best be encouraged by scholarships, taking care to connect the scholarship scheme with the system of technical and industrial education in the province. In determining the choice of an industry Local Governments should, in our opinion, obtain assistance from the mercantile and industrial public, and take all measures that appear to them to be possible and expedient for interesting the influential sections of that public in the scheme. Industries in which native capital and enterprise are engaged, or likely to be engaged, will be particularly appropriate for selection. It should be borne in mind that men who have received an expensive European training

can be employed only upon such industries as are susceptible of being organized upon a considerable scale.

6. In each case in which a Local Government recommends a scholarship, it will be necessary for it to support its selection by giving the Government of India some account of the state of the particular industry which it is intended to promote and some comparison with other industries which might be considered eligible for encouragement. In determining the industry to be studied and choosing the man recommended for the scholarship, the Local Governments and Administrations will be required to bear in mind the importance of ensuring that the returned scholar shall find scope for his skill and ability. It has been proposed on the one hand that such scholars before they are appointed should be placed under engagement to serve Government on their return. On the other hand, it has been suggested that private firms should be asked to guarantee their employment, and that the scholars should be reciprocally bound by engagement to such firms. We consider that the holder of one of these scholarships should not be bound by any such engagements, but that the prospect of his chances of employment after the completion of his studies should be well weighed when he is selected, and that upon his return the choice of his career should be in the first instance determined by his own inclination. If the early results of the scheme are successful, we think that the services of the returned scholars are sure to be in good demand, and that, failing private employment, Government will be glad to turn their abilities to account as teachers in industrial schools or in other capacities connected with the improvement of local industries.

7. It is our intention to make it a condition of the grant of these scholarships that no candidate is to be selected for recommendation to one of them on the result of competitive examination either open or limited. It is desirable that, in selecting the industry to which they are to be directed, Local Governments should give the widest possible publicity, through such channels as they think fit, to their intention to nominate scholars, and that they should take such advice as they need from persons cognizant of the industry and from officers and others connected with technical education. In making the selection they should bear in mind the fact that it will be necessary for the student to have a competent knowledge of English, or of the language of any other country to which he is to be sent; and they should also be guided by considerations of his capacity, intelligence, practical interest in the industry, and the assurance which they feel that he will continue to devote himself to it on his return to India. These are matters which cannot be decided by competition; and we intend that it should be made clear from the beginning that these scholarships are not to be regarded as prizes, for which everyone has a right to claim an equal opportunity of competing. It is not necessary to lay down more precise rules as to the kind of general education which the scholar is to have received. Governments will act on their own discretion, having regard to the above considerations. As a general rule a scholar before being nominated should have received the best technical education available in the province in the particular industry which he has to study. The standard of this education differs in different industries, and each may be considered on its own merits. Even if the standard of technical education in a particular industry in a province is low, the scholar may be nominated if he has availed himself of the best facilities obtainable, and shows an interest in the industry. No age limit will be laid down for scholars and none should be generally laid down by the Governments; but an age limit may at the discretion of a Local Government be fixed for any particular scholarship for which they invite applications. The particular industry to be studied will, as is stated above, be specified by the Local Governments in nominating a scholar, but they will hardly be in a position to define minutely the course of study to be pursued nor will they ordinarily be in possession of the most recent information as to the facilities for such studies existing in England and elsewhere. We are inclined to think therefore that the best plan will be to leave these matters to be settled by Your Lordship when the scholar arrives in England; and if this view is accepted we will arrange that timely information shall be submitted to you as to the probable date of each scholar's arrival and the subject which he is required to study. We propose that those scholars who study in England should be under Your Lordship's control and we trust that in the case of those who elect to pursue their studies on the Continent or in America Your Lordship may be able to make suitable arrangements for their supervision. The conditions under which they will hold their scholarships will be similar to those laid down for Government of India scholarships. Progress reports will be required upon them from time to time, and power will be retained to cancel a scholarship and to send the scholar back to India if his progress is not satisfactory.

8. Should the principles which we have advocated in connection with the institution of these technical scholarships meet with Your Lordship's acceptance, we trust the scheme for the establishment of ten scholarships of £100 a year may receive Your Lordship's early sanction.

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## *No. 24 (a).—Despatch from the Secretary of State* re *technical scholarships.*

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No. 65 Public, dated the 29th May 1903.

From—The Right Honourable LORD GEORGE FRANCIS HAMILTON, His Majesty's Secretary of State for India,
To—His Excellency the Right Honourable the Governor General of India in Council.

Proposed Technical Scholarships for Natives of India studying in Great Britain or other Western countries.

On receipt of the letter of Your Excellency in Council No. 8 (Education), dated the 9th October last, in which you proposed the establishment of ten State technical scholarships, to be awarded annually to natives of India studying in Great Britain or other Western countries, I thought it desirable to obtain the opinion on the scheme of the Board of Education.

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2. I enclose a copy of the letter addressed to the Board, and of their reply thereto.

3. It is not necessary for me to assure Your Excellency that the principle of the scheme, which applies to India a system which has, I understand, proved very successful in the case of Japan, and more recently in that of Siam, meets with my full approval, and that I cordially sympathise with the desire of your Government to further the development of Indian industries by providing promising young men with the means of studying the progress which has been made in industries and arts in the most advanced countries of the West. It appears to me, however, that before the details of the scheme can be finally settled there are some points which call for further examination.

4. Your Excellency will observe that the Board of Education express a doubt, which I share, whether a scholarship of 100*l*. a year, in addition to fees and travelling expenses, will fully meet the expenses of a student in this country. I observe that in 1887, when dealing with the existing Government scholarships of 200*l*. a year, the Government of India found it necessary to issue a public warning that "while the scholarship allowance of 200*l*. a year is sufficient to cover the necessary expenses of college life at Oxford or Cambridge, it is very desirable, if not absolutely necessary, that the scholars should have some small private resources of their own to meet expenses in the vacation and other general expenses which are scarcely avoidable." And it appears to me that the holders of the proposed technical scholarships will be in the same case. I would therefore ask you to consider whether it is not necessary to fix some higher limit to the scholarship allowance.

5. I observe from your fifth paragraph that it is proposed to connect the scholarship scheme with the system of technical and industrial education in the various provinces, which will no doubt be established as the result of your deliberations on the report of the Industrial Schools Committee. I do not gather from the replies of the various Local Governments which you forward that there is any large supply of qualified candidates for the scholarships as yet forthcoming, at any rate in the two provinces which are believed to be industrially most advanced,—Bombay and Bengal, and I should suppose that it would take some time to bring into existence a class of students trained in properly equipped technical schools in India, who would be ready to take up the scholarships when established. Before, therefore, sanctioning any definite annual number of scholarships to be awarded, I think it would suffice to announce the readiness of Government to give a scholarship or scholarships if promising and well-qualified candidates present themselves in some particular branch of industry. In other words, it appears to me that the scheme should for the present be worked experimentally, its further development being left for consideration when your technical institutions in India have begun to produce a class of students who might be expected to profit by its extension.

6. I notice that you exclude from the scope of the scheme Law, Medicine, Forestry and Veterinary Science, as being already provided for; and certainly there is no lack of Indian students who, without the inducement of a scholarship, visit this country in order to study the first two of these subjects. Engineering is not mentioned among the excluded subjects; you are, however, aware that Indian candidates present themselves in considerable numbers for entry to the Coopers Hill College, while the Engineering Colleges in India are, I presume, capable of giving instruction of a high class in that subject.

7. I shall be ready, with the advice of the Board of Education, to undertake the selection of the course of technological study best fitted to the needs of any particular scholar. Your Excellency will observe that the Board, in the concluding paragraph of their letter, ask that they may, in any case in which their advice is desired, be furnished with full particulars as to the past educational experience and future requirements of each scholarship-holder. Should any student elect to pursue his studies on the Continent or in America, it would probably be found possible to obtain from the head of the institution where he is studying a periodical report on his progress and conduct; but no more extended supervision by this Office would in such a case be practicable, and I should hope that the persons selected for the scholarships would ordinarily be of such formed character and habits, and of such an age, that detailed tutelage would in their case be unnecessary.

## Enclosure No. 1

No. J. and P. 2392—02, dated the 25th February 1903.

From—Sir Horace Walpole, K.C.S.I., C.I.E., Under Secretary of State for India,

To—The Secretary, Board of Education, London.

I am directed by Lord George Hamilton to enclose, for the information of the Board of Education, a copy of a despatch* which has been received from the Government of India, proposing the establishment of ten scholarships annually for natives of India who may desire to pursue technical studies in Great Britain or other European countries.

*No. 8, dated the 9th October 1902, with enclosures.

It will be seen that the Government of India, while contemplating that the particular industry to be studied by a scholarship-holder shall be determined in India by the Local Government before he is nominated, propose to leave to this Office the prescription of a course of study, with reference to the facilities for such studies existing in England and elsewhere. They propose also that special arrangements should be made for the supervision of any students who may elect to pursue their studies on the Continent or in America. The value of the scholarships is fixed at 100*l*. a year, in addition to the fees payable to the institution where the scholars will study, and travelling expenses.

Lord George Hamilton would be much obliged if the Board of Education would favour him with their advice on the proposed scheme, and, in particular, in regard to those points in it which

No. 24 (*b*). Technical Scholarships, 1903.

are enumerated in the preceding paragraph. There is not at present in this Department any official who could be made responsible for selecting a course of study for an Indian holding a technical scholarship, and His Lordship hopes that if the scheme is brought into operation he may count on the assistance of the Board of Education specially in this respect.

It is understood that the system of deputing students to Europe for technical study has been adopted with much success by the Government of Japan and more recently by that of Siam; and it is probable that the experience gained in these cases (if known to the Board of Education) would afford some criterion of the results which may be expected from the establishment of a similar scheme for natives of India.

Lord George Hamilton would be glad to learn whether, in the opinion of the Board, an allowance of 100*l*. annually (in addition to fees and travelling expenses) is likely to suffice for the support of an Indian in this country while undergoing a course of study.

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ENCLOSURE No. 2.

Dated the 21st April 1903.

From—Mr. ROBERT L. MORANT, C.B., Secretary, Board of Education, London,
To—The Under Secretary of State for India.

In reply to Sir H. Walpole's letter of February 25th, I am directed by the Board of Education to state that they regard the proposed establishment of ten annual travelling scholarships for natives of India who shall pursue technological studies in Great Britain or some other Western country as likely to prove of benefit to Indian Industry and Education.

The Board note that the Government of India in their Despatch of October 1902 contemplate cases in which the scholar will elect to pursue his studies in America, while in your letter of 25th February last the sphere of study is limited to Great Britain or other European countries. If this discrepancy is due to inadvertence, the Board would take this opportunity of saying that in their opinion some of the scholars might derive special advantage from a course of study in America supplementing a period of residence in Europe.

If requested by the Secretary of State for India, the Board of Education, though unable to undertake responsibility for the personal supervision of the students, will be happy to give such advice as is within their competence, from time to time, as to the course of technological study best fitted to the needs of any particular scholar.

In reply to the question of the Secretary of State as to the sufficiency of the proposed annual allowance, the Board are of opinion that 100*l*. annually (in addition to fees and travelling expenses) would not be adequate to the student's needs, and they believe that this view is confirmed by the experience of those who have organised similar scholarship systems for the Governments of Japan and Siam, but, of course, much would depend on the social status of the scholars and on the country to which they were sent.

In this connection the Board of Education would be glad to receive more precise information as to the exact educational standing of the proposed scholarship-holders. The Board are at present not clear whether it is contemplated that these scholars should pursue technical studies of the highest grade, or of an intermediate character, or whether they might even be of artizan rank; but it is presumed that the reference is to the needs of the first two classes. In any case in which the Board might be called upon to advise with regard to any student they would desire to be furnished with a statement of his past educational experience and future requirements.

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# *No. 24 (b).—To Local Governments* re *technical scholarships.*

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Nos. 565-572, dated the 21st September 1903.

From—W. S. MARRIS, Esq., Under Secretary to the Government of India, Home Department,
To—Local Governments and Administrations.

I am directed to forward, for the information of — the Governor in Council / His Honour the Lieutenant-Governor / your information, a copy of the papers noted on the margin, regarding the institution of State technical scholarships to enable natives of India to pursue a course of study in Great Britain or other Western countries.

Despatch to the Secretary of State, No. 8, dated the 9th October 1902.
Despatch from the Secretary of State, No. 65, dated the 29th May 1903, and enclosure.

2. In view of the doubts expressed by the Board of Education and the Secretary of State as to the sufficiency of the proposed amount of the scholarships, the Government of India think that it would be well to fix their value at £150 a year. As has been pointed out, however, the question depends largely upon the status of the scholar, and on the country to which he proceeds for study: and if in any particular case the Local Government regards the sum now named as insufficient the Governor General in Council will be prepared to consider proposals for increasing it.

3. Instead of announcing the intention to award a definite number of scholarships annually, the Government of India agree with the Secretary of State that it will for the present suffice to

intimate the readiness of Government to give a scholarship or scholarships if promising and well-qualified candidates present themselves in some particular branch of industry. They further accept His Lordship's suggestion that Engineering should be excluded from the scope of the proposals.

4. Subject to the foregoing modifications, the Despatch of 9th October 1902, to the Secretary of State indicates the conditions under which the Government of India desire to introduce experimentally a scheme of technical scholarships. The information now before them suggests that the textile industry in Bombay and the mining industry in Bengal will be found to offer the most favourable fields for the initiation of the experiment.

The Government of India will, however, be glad to consider any suggestions which the Government of ______ you may have to offer for the establishment of a technical scholarship in any other branch of industry which can thereby be developed, if a suitable candidate can be found.

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# *No. 25.—Resolution of the Government of India on the report of the Committee on Industrial Schools in India.*

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*No. 31 Educn., Resolution of the 14th January 1904.*

## REPORT OF THE COMMITTEE ON INDUSTRIAL SCHOOLS IN INDIA.

In the course of a general review of the subject of technical education the Government of India arrived at the conclusion that industrial schools in India have been wanting in definiteness both of methods and objects, that there has been in them, no clear differentiation between general and technical studies, that they have depended for support upon the casual efforts of local bodies rather than upon any sustained policy on the part of the Provincial Governments, that they have been insufficiently co-ordinated with particular local industries or trades, and that the impression produced by them either upon industrial development or upon industrial education, has been relatively small.

2. In order to bring these views to the test, the Government of India decided in December 1901 to appoint a Committee* to visit the different provinces in connection with the institution of industrial schools, to examine into what had already been done, and with what measure of success, and to confer with local educational officers and others as to the best means of establishing such schools. The Committee were instructed that the views which the Government of India were inclined to hold upon the subject were as follows :—

* Colonel J. Clibborn, I.A., C.I.E., *President*.
Mr. C. A. Radice, I.C.S.; Mr. R. E. Enthoven, I.C.S.; Revd. Foss Westcott, M.A. — *Members*.

(*a*) That the instruction given in such schools should be technical in preference to general specialised instead of diffuse.

(*b*) That the most useful form of industrial school is a local trade or crafts school, directed to the furtherance or development of a local industry, which appears to be capable of expansion by the application of superior methods or implements.

(*c*) That such schools may be either rural or urban, according as the industry in question is practised in the country or in towns.

(*d*) That in country districts such schools will best be devoted to the study and development of single indigenous products; in towns to the development of manufactures : and that in towns it may be possible to collect several industries in a single building and to give instruction in diverse branches of industry or manufacture.

(*e*) That such schools, whether country or urban, should be primarily educational, and not commercial institutions; that they should be, as far as possible, self-supporting, but should not compete with established private trades.

(*f*) That only such pupils should be admitted as will proceed to practise the industry taught.

(*g*) That the levy of fees is a proper feature of industrial schools, but that it must be dependent upon the position and means of the pupil and the stability and popularity of the institution, and cannot everywhere be enforced in the early stages.

(*h*) That it will be a necessary preliminary to the institution of such schools to ascertain what are the industries or manufactures to which they may be applied, in the light of the industrial surveys already made.

(*i*) That, where it is considered possible to open new or extended markets for the produce of the industry or manufacture thus developed, it will probably be found desirable to connect them with commercial museums, both in and outside of India.

(*j*) That for the present the best available teachers, overseers, and foremen for these schools should be procured either in India or from abroad; but that in time it is hoped that they may be produced in larger numbers by institutions at suitable centres in India, where the investigations of products and industries can be carried on.

(*k*) That in provinces where the suggested developments admit of wide or rapid growth, it should be for the consideration of the Local Governments whether a separate Technological Department of Government may in time be instituted, for their special supervision and control.

**No. 25. Committee on Industrial Schools, 1904.**

3. The recommendations of the Committee will be found summarised at the beginning of their Report.* Many of these recommendations travel far beyond the terms of their instructions, and deal with matters bearing upon general industrial development and research, the regulation of factories, and other miscellaneous questions into the discussion of which the Government of of India do not now propose to enter. Upon the subject of industrial education, the Committee have not submitted definite proposals for carrying out the principles commended to them, and applying them to particular schools. They state in the last paragraph of the Report, Part I, that in the absence of a complete survey of industries they have found it impossible to make detailed recommendations as to particular industries and the methods of instruction that may with advantage be applied to each. But they have put forward a series of proposals which, instead of applying the principles set forth above, suggest the creation of a new system resting upon an entirely different basis.

4. The central recommendation of the Committee is that industrial instruction in India should be organised upon the model of the Casanova boy artisan school at Naples. This institution aims at giving the boys belonging to the poorer classes of a notoriously vicious population such mental, moral, and manual training as will turn them into good citizens, honest men, and skilful artisans. It is a day school at which attendance is enforced for long hours throughout the year, including Sundays and holidays, in order to withdraw the boys as much as possible from evil home influences. The course is one of 7 or 8 years from the age of 8 to 15, the hours of weekly attendance ranging from 31¾ to 67. For the first three years the boys receive elementary instruction, including drawing and modelling, and at the age of eleven they enter one of the workshops attached to the school. From that time forward they spend their time partly in the workshops—for from 34½ to 39 hours a week—and partly in school. The workshops are attached to the school, and are occupied by master artisans who are permitted to occupy them rent-free upon undertaking to conduct their trade there, to employ none but boys of the school as apprentices, and to be in all matters obedient to the principal of the school. The master artisans work upon their own account for the market, and the school is not financially interested in their transactions. Fourteen master artisans are thus concentrated within the school building, who follow fourteen trades varying from bronze-founding to watch-making. The workshops are patrolled by the school teachers, whose duty it is said to be to see that the boys are taught in the best possible way and that strict discipline is maintained. Besides working in the workshops, the boys learn drawing and modelling in the school, and also receive other instruction compendiously described as desk-work, of which no particulars are given. As soon as their work begins to be of value in the workshops, the boys receive wages, and upon leaving school they have no difficulty in obtaining well-paid work as artisans. The cost of the teaching of each boy is stated to be R80 per annum.

5. The views of the Committee as to the adaptation of this system to India are contained in their Recommendations, Nos. 5, 16 to 31, and 41 to 47, which precede the report. It is proposed that in the first instance selected factories, workshops, and craftsmen's shops should be registered for the training of apprentices under Government supervision, and that eventually the craftsmen should be induced to gather together under one roof or in one group of adjoining workshops. The inducement offered to them to do so would be monetary rewards loans, expert advice free of charge, and the other advantages detailed in paragraph 26 of the report. The monetary rewards to the master craftsmen for the progress of the apprentices would take the shape of a system payment by the result of examinations. The apprentices would be housed in hostels and would receive rewards and certificates on the results of the test examinations, and would be given facilities for being indentured to large factories. So far the proposals do not provide for giving the apprentices any school instruction. The Committee (paragraph 11) regard the "class system" as generally inefficient, costly, and unsuited to institutions supported out of public funds, but they propose (paragraph 44) that opportunities should be given for the apprentices, as well as for working artisans, to attend voluntarily at classes held at night schools out of working hours. Existing industrial schools should, the Committee think, either be converted into supervised workshops working for a profit, and supplemented by night classes for other instruction, or else classified, not as industrial schools, but as schools of general instruction in which manual training forms part of the curriculum.

6. The scheme thus sketched by the Committee is one which has for its end the abolition of the industrial schools and the substitution for them of a system of supervision of workshops. The arguments drawn from the existing defects of Indian industrial schools (stated in Chapter 1) which have led the Committee to the conclusion that the class system is inefficient and unsuitable, appear to the Government of India to be unconvincing. In support of the proposition that industrial education should not be imparted in industrial schools an appeal is made (paragraph 15) to the practice of other countries. The educational conditions of India are so different from those of European countries that the argument from foreign precedents must in any case be received with caution. But the Government of India believe that in fact foreign educational methods show no tendency to substitute teaching by apprenticeship for teaching in schools ; but that, on the contrary, industrial schools have been, and are being, called into existence in order to supply the defects of the apprentice system, which not only fails to give proper technical instruction, but also in many cases cannot even provide economically for the complete training of the apprentices in manual dexterity. Paragraph 11 of the report claims that the proposal to substitute the apprentice system for industrial schools in India is supported by the general opinion of the authorities consulted. The Government of India are unable to agree in this conclusion : it appears to them that the proposal is contrary to the weight of the evidence recorded in Part II of the Report. Reference to the joint report of Mr. Giles, Dr. Thomson, and Mr. Burns (page 113), and to the opinions expressed by Mr. Giles (page 118)—Dr. Thomson (pages 121 and 123), Mr. Burns (pages 126 and 127), Mr. Chatterton (pages 166-167), Mr. Bell (page 47), Mr. Lewis (page 26), and Mr. Sly (page 83), and also to the scheme put forward by Mr. Pedler (pages 21—23), shows that none of these authorities can be quoted as favouring the substitution of the apprentice system for the system of industrial schools.

* Copies of the Report have been circulated to Local Governments and a limited number are available for purchase with Superintendent, Government Printing, Calcutta.

Mention is made (paragraph 7) of an attempt to conduct the Lucknow Industrial School in accordance with the scheme recommended by the Committee. That experiment has now been tried and has proved a complete failure; and it has been found necessary to abandon the experiment and to reconstruct the school. The Government of India are therefore unable to find in the arguments advanced by the Committee, in the example of other countries, in the opinions of the expert witness, or in practical experience in India, any reasons which would justify them in sweeping away the present industrial schools and substituting the system described in this Report.

7. The proposals of the Committee appear, moreover, to the Government of India to be open to certain serious objections—

(i) The principles accepted by the Government of India in respect of technical education are that all such education should rest upon the basis of some preliminary education of a simple but practical nature, that this preliminary education is better communicated as a part of ordinary primary education than in industrial schools, and that the instruction given in industrial schools should be technical rather than general. But in the school recommended by the Committee for imitation, there is no such separation. Both general and technical education are given in the same institution and under the same supervision.

(ii) It appears to the Government of India that the value of instruction in the principles underlying processes upon which industries depend is insufficiently appreciated by the Committee. In their report, all teaching, other than actual workshop practice, is relegated to a subordinate place, and is to be given voluntarily in night schools. And so little importance do the Committee attach to the matter, that they have indicated only in the merest outline the manner in which such schools should be conducted or the courses of study which they should offer. Judging from previous experience, however, the Governor-General in Council has little expectation that youths who spend the entire working-day in workshops will voluntarily attend a night school with any regularity, and he has no doubt whatever that systematic instruction in principles is essential to the success of any system of industrial training.

(iii) When they come to discuss the practical instruction to be imparted to pupils, the Committee dwell with emphasis upon the marketable value of the work to be done. In the judgment of the Government of India, this position is based upon a failure to distinguish sufficiently between a school and a commercial undertaking. In communicating their views to the Committee the Government of India expressed their conviction that industrial schools should be primarily educational, and not commercial, enterprises. The Committee, on the other hand (Recommendation No. 43), maintain that such institutions should aim at financial profit. The Government of India agree with the Committee in thinking that industrial schools as at present conducted frequently fail to train their pupils up to the standard of manual skill required for the market, and pursue unpractical methods. It is most wholesome, therefore, that they should be brought to the test of producing saleable articles. But this is a very different thing from requiring progressive and methodical industrial training to be sacrificed to the necessity of showing a profit on the work done by the boys, and in so far as the two objects are incompatible with one another the Government of India desire to give precedence to the former.

(iv) Finally, it appears to the Government of India, as also to several of the witnesses examined by the Committee, extremely improbable that in India artisans could be concentrated round a school in the manner proposed, and subjected to control of the kind contemplated by the Committee. Here and there under very special conditions such an xperiment might succeed; but it cannot be regarded as offering a solution of the general problem of industrial education.

8. While they have felt bound to point out the defects in the Report, the Government of India desire at the same time to acknowledge the useful work that the Committee have done. They have collected information, which was nowhere else available, as to the number of the existing industrial schools, with particulars of the trades taught, the qualifications of the teachers, the numbers of the pupils, and the cost of the undertakings. Their Report gives a valuable account of the conditions of certain trades, and of the prospects of their development, with suggestions as to the points to which inquiry should be directed. The native system of apprenticeship and the working of trade guilds are explained and illustrated in an interesting and suggestive manner. They have emphasised the important principle that the object and justification of the schools must be to impart skill in a specialised manner, and to aim at improving a trade, and not merely at perpetuating existing routine methods. And they rightly point out that these objects can be attained only by the employment of skilled teachers, and of well-qualified inspectors having a practical acquaintance with the processes that are taught.

9. As matters now stand, two entirely different sets of principles have been put forward, and nothing has been done to bring either of them to the test of practice. In commending the question to the attention of Local Governments, the Government of India have no desire to restrict them unduly in their choice of methods. They endorse the opinions expressed by several witnesses that it is impracticable to build up rapidly a great fabric of technical education in India at the present time. The matter has not yet passed the stage at which many experiments must be tried, and a proportion of failures must be expected. At the same time, there are certain broad principles which they think should govern the action to be taken.

10. For practical purposes it is most necessary to distinguish between the kind of institutions which will be suitable in great industrial centres, such as Bombay, Howrah, or Cawnpore, where capital is employed in the organization of industries on a large scale, and those suitable for towns in which the local industries are practised as handicrafts in small private establishments. In the former case action may proceed on bolder and more advanced lines than in the latter; for where there are organization and capital, there must also be intelligence sufficient to appreciate the value of properly trained workers. In such places the employers are already convinced, a demand exists which it is the object of Government to supply, and the bonds of caste and trade guilds are generally speaking less strict than elsewhere. But even in those cases it will still be necessary to convince the employés of the value of the training which industrial schools offer. It is of the first importance

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therefore to enlist the active co-operation of employers of labour in the scheme, for if the employés see that employers attach importance to the training which it offers, they will be far more ready to believe in its value. Moreover, there are signs that an era is approaching of a considerable expansion in the industrial employment of native capital; and this prospect may justly be taken into account as offering a probable opening for more highly trained men. In such centres of industry as those which have been named, it seems to the Government of India that it should be possible to set up whole-time schools to which pupils will be admitted after reaching as high a standard of general education as can be exacted. The school would be fitted with the plant appropriate to some one trade, and the pupils would receive a course of instruction fairly divided between actual workshop practice and the study of the principles and scientific processes on which the trade depends. An instance of such a school is provided by the Victoria Jubilee Technical Institute in Bombay. Numerous examples are to be found in other countries; and where Indian come into competition with foreign manufactures, the object should be, as far as possible, to produce an Indian workman as well trained as his foreign competitor. The technical scholarships which Government have instituted, and regarding which Local Governments have been separately addressed, will be of great importance in developing such schools, and in enabling the Indian student to study foreign examples of technical training and to adapt them to Indian conditions. In the first instance, however, it will probably be necessary to offer scholarships to the pupils in such schools until the commercial value of the training has been established.

11. In the case of local handicrafts, the problem is at once more important and more difficult. It is more important, because it is only through the small industries that any real impression can be made upon the industrial classes of India. It is more difficult, because in this case the employers no less than the employés require to be convinced of the value of systematic training as the basis for manual skill. The trades are ordinarily in the hands of guilds constituted on a caste basis; and, in order to succeed, the system of instruction must secure their co-operation. The age at which children begin to work in India is very young, and it is not to be expected that parents of the artisan class will agree to keep their children unremuneratively occupied until they have first secured a good grounding in general education and have then passed through a course of industrial instruction. These considerations were doubtless present to the minds of Colonel Clibborn's Committee, and may have led them to their conclusion in favour of supervised workshops. But it is not possible for the State to undertake anything approaching to universal industrial education administered by artisans in private workshops under State inspection. Effort must be confined to producing artisans who will rise to a distinctly higher standard both of general intelligence and of manual skill than can be obtained by the ordinary traditional routine. The supply of pupils for such instruction implies some self-sacrifice on the part of parents, and this must be met by scholarships which will suffice for the maintenance of the pupils while they are being trained.

12. It remains to examine the lines on which a practical beginning should be made. It appears to the Government of India that the two important objects (1) of keeping up and developing a boy's inherited manual skill, and (2) of giving him a general education which will enlarge his prospects as a craftsman while preventing him from falling into the clerical groove—might be attained by starting in selected places half-time industrial primary and higher primary schools, the course of studies in which should be designed with special reference to teaching that accuracy of workmanship in which Indian artisans are conspicuously deficient, and to familiarising the pupils with the best designs and processes as applied to their hereditary trade. Geometrical drawing and designing would therefore form an essential part of the course, and the general education given would be determined with reference to the trade. The boys would spend half the day at the primary school, and the other half in working as registered and supervised apprentices under approved artisans, who would receive a monetary reward for each apprentice on the conditions, (1) that they taught them the trade thoroughly and not merely the elementary processes, (2) that they accepted supervision and control by a Government expert.

13. If such a scheme be attempted, there are certain conditions which should be strictly enforced. In the first place admission should be strictly limited to pupils whose caste occupation is the industry which the school is intended to develop. The obligation to work in the workshop would probably effect this automatically. Secondly, the education given in the primary school should be so ordered as not to fit the pupil for clerical employment. No English should be taught, and the reading should be limited to the vernacular. Thirdly, as mentioned above, scholarships for all the pupils should be provided, at any rate for some time to come, and this condition alone will greatly limit the scope of possible effort. Further, if any progress is to be made with such a scheme, an inspector will be required who knows more than the teachers whose work he is to inspect, including the teachers in the workshop.

14. The appointment of such an inspector presents great difficulty. The statement of his qualifications implies that he could only efficiently supervise one industry. A single province will not at first find sufficient employment for such an officer, and the diversity of languages will be a great obstacle to his employment in more than one. The Government of India have sought the advice of Local Governments and Administrations as to how this difficulty may best be overcome. It may be that the experiment should at first be confined to a single industry; and, if so, it would probably be well to give the preference to weaving. The Government of India are inclined to think that, if one or more expert inspectors of this industry can be found qualified to promote such a system of teaching, they should be provincial officers attached to one or more provinces rather than imperial officers.

15. Such a scheme as has been sketched above, both for the larger industrial enterprises and for smaller handicrafts, must, the Governor-General in Council thinks, in the main depend upon Government and not upon private management. It is essential that the trade and the subjects of instruction should be properly selected, and this cannot safely be left to the chance of private enterprise in the same way as the establishment of ordinary schools where the curriculum is of a defined type. The function of a teacher of an industrial school is far more specialised than that of an ordinary school teacher, and the Government is better able than private individuals to offer secure employment to such a man.

16. Meanwhile, grants-in-aid should still be made for efficient industrial instruction in schools under private management. The organization of the existing schools, should, however, be carefully reviewed in the light of the criticisms which have been passed upon them. Their object being to produce intelligent artisans, the extent to which they attain that object should be scrutinized; inappropriate trades should be discarded, and specialised instruction should be given in one or a few industries; the course of instruction in the school workshops should be supplemented by appropriate lessons in class, which should be differentiated according to the particular industry for which the pupil is intended. Where it is found that the passed pupils do not follow the trades that they have been taught, the remedy will be to take the necessary measures to restrict admission to the pupils who are likely to follow the industry, to direct the instruction specially and closely to a preparation for it, and to study all means of providing an easy passage from the school to the workshop.

17. The solution of the problem must rest mainly with Local Governments, and must be approached by them with reference to the general considerations above presented. They have been asked to be good enough, after consideration of the Committee's Report and the foregoing suggestions, to inform the Government of India of the action which they would propose to adopt and to state the industry or industries with which experiment should be commenced.

G. I. C. P. O.—No. 6282 H. D.- 8-5 1906-404-R. H. S.

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